INTRODUCTION

GENERAL

This service manual has four chapters covering the **MRC-400/450** Mobile Recycling Center, and **MTC-4000/4500**. The serial A units will be refereed to as MRC-400/450. The manual covers the following topics: AC/DC Distribution, Theory of Operation / Troubleshooting, Maintenance and Calibration Procedures, and a Parts List.

The MRC-400/450, and MTC-4000/4500 are capable of the following functions:

1. Reclaim, clean, and store refrigerant for reuse.
2. Pull a vacuum on an Air Conditioning System.
3. Accurately charge an Air Conditioning System with refrigerant.
4. MRC-400/MTC-4000: Charges R-12, and R-500.
5. MRC-450/MTC-4500: Charges R-134a.

NOTE: *The following is a breakdown description for Serial Numbers:*
Serial # Location - Rear Cabinet top right hand side.
Example: 0692A0101
06 Month MFG.
92 Year MFG.
A Serial Rev.
0101 Number of Unit.

NOTE: *MRC-400/450 WITH A DATE CODE OF XX**92** AND EARLY XX**93** MAY HAVE THE LETTERS A, B, OR C. THESE ARE SERIAL A UNITS. PLEASE CONFIRM BY CHECKING SOFTWARE LEVEL, SEE BELOW.*

SERIAL A SOFTWARE STARTS WITH 1.XX ON POWER UP.

FUNCTIONAL DESCRIPTION

Auto Sequence: Press **<AUTO SEQUENCE>** to begin an automatic sequence: Recovery, Evacuate, Vacuum Hold, Oil Charge and Refrigerant Recharge. The unit can automatically recall entries from the last AUTO SEQUENCE operation by pressing and holding the **<AUTO SEQUENCE>** for five seconds.

Reclaim Only: Press **<RECLAIM ONLY>** to recover refrigerant from the air conditioning system. Refrigerant gas enters the MRC-400's suction separator through two service hoses. The unit traps oil and solid contaminants at the bottom of the separator bowl. The pump pulls refrigerant gas from the top of the bowl. Then the compressor compresses the refrigerant to a high-pressure gas.

Next, the high-pressure refrigerant gas enters the condenser. Two continuously running fans blow air across the condenser. The air removes heat and condenses the high-pressure gas into a high-pressure refrigerant liquid. The liquid flows out of the Condenser and through the Master Filter/Drier. The unit collects the refrigerant in the recovery tank. When the unit finishes reclaiming, the operator panel is green, COMPLETED LED lights. Unit can display the amount of refrigerant recovered that was added to the scale by pressing the **<AMOUNT>**.

FUNCTIONAL DESCRIPTION continue...

Vacuum: After you open a vehicle air conditioning system, you cannot immediately recharge it. First, you must evacuate the system (pull it into a deep vacuum). The Air Conditioning system contains moisture. Pulling the system into a deep vacuum removes this moisture. Evacuating the system also removes the non-condensable gases remaining in the system. Only use the vacuum function when system pressure is "O". In the vacuum function, non-condensable gas enters the suction separator through both service hoses. The gas proceeds down to the compressor, and out the pressure side. Then the unit expels non-condensable gas into the purge bottle.

Charge: The MRC-400/450, uses an electronic scale to measure refrigerant and oil charge. The scale is accurate to within 1/10th of an ounce. A heating blanket warms the virgin refrigerant in a 15/30/50 lb. cylinder increasing the pressure and speeding up a charge. Charging proceeds at about one pound per minute. The oil cylinder has a capacity of 20 ounces. (20 ounces of oil + 10 ounces of refrigerant) The recovery tank and oil cylinder do not have heater blankets. Charging occurs when the computer board opens the reclaim solenoid. With refrigerant in the recovery tank, the open solenoid allows flow to service hoses. The unit charges until pressures equalize between the vehicle and the recovery tank. If the unit has not completely filled the system, the unit displays "slow charge." Then the unit switches over to virgin refrigerant and continues to charge. Charging stops when the scale weight loss equals the amount keyed in by the technician.

ELECTRONIC SAFETY PRECAUTIONS

When working on this tester, keep three points in mind:

- Tester voltages refer to the "return" (white) side of the AC line. Yet sometimes outlet wiring is reversed. In that case, electronic ground connects to the "hot" side of the line. The tester operates normally, but the PC board floats 115 VAC above safety ground.
- Assume that points inside the tester chassis are at 115 VAC. Act appropriately. If you make measurements with grounded test equipment, use an isolation transformer. An oscilloscope is an example of such test equipment.
- MRC-400 testers are susceptible to power line spikes and noise. You must connect the equipment to safety ground, otherwise, the MRC-400's surge suppressors can not clip power line spikes properly. Does your machine do "strange things" or exhibit intermittent problems? Check for a proper ground at the machine and the power outlet. If you are using an extension cord, then check that, too. It must be constructed of at least 18 gauge wire and under 10 feet long.
- Schematic voltages refer to the "return" side of the line, not safety ground. When measuring voltage, use the white wire on the line power terminal block as ground. Don't use the three, center safety ground terminals. Another place you can access ground is at the shield. The black wire in the shielded transducer cables also connects to the ground return.

REFRIGERANT SAFETY WARNINGS

⚠ WARNING!

USE STANDARD REFRIGERANT HANDLING
SAFETY PROCEDURES WHEN PERFORMING INSTALLATION

ALWAYS WEAR SAFETY GOGGLES, DON'T SPILL OR TOUCH LIQUID REFRIGERANT, AVOID FLAMES, AND EXCESSIVE HEAT. USE ONLY IN WELL VENTILATED AREA.

When handling R-12 refrigerant, you must follow proper precautions. R-12 is extremely evaporative. Exposure to liquid R-12 can result in frostbite. Always use appropriate safety precautions while testing, operating, servicing or transferring R-12.

- **WEAR SAFETY GOGGLES.** When servicing or operating the tester, always wear safety goggles (0001-5005).
- **DON'T SPILL OR TOUCH LIQUID R-12.** If your skin contacts liquid R-12, you can develop frostbite. Evaporating R-12 removes latent heat from whatever it contacts. Open all fittings slowly to release pressure. Operate testing and service valves according to applicable instructions. If someone's skin comes into contact with liquid refrigerant, treat the skin for frostbite.
- **AVOID FLAMES.** Under normal conditions, R-12 is non-toxic. Yet an open flame reacts with R-12, producing phosgene gas. This is a well-known fumigant and highly toxic poison. NO SMOKING! A cigarette becomes hot enough to cause this reaction.
- **AVOID EXCESSIVE HEAT.** Within a refrigerant container, pressure rises with heat. Store containers upright, out of the sun and away from heat vents.
- **VENTILATION.** Adequate ventilation is essential for several reasons. The R-12 gas displaces air. Large quantities of R-12 in a confined space can cause suffocation. Also, when R-12 levels in the air are high, leak detection is difficult. Keep the MRC-400 unit in a well-ventilated area.

SERVICE GUIDELINES

- **BEFORE REPLACING** circuit boards, verify that the main power supply operates within specifications.
- **VERIFY** that board connectors are fully seated.
- **NEVER** remove boards or disconnect a connector with the power on!
- **MAKE SURE** that you completely understand what the tester does. *(If it works, you can't fix it!)* Refer to the *MRC-400/450 Operator's Manual*, application notes, and flow diagrams.
- **CONSULT** the Service Bulletin Binder. It may identify and explain how to correct the problem.
- **BE CAREFUL** when handling circuit boards! Wear an anti-static wrist strap.
- **WHEN TRANSPORTING** circuit boards, use anti-static bags.

HANDLING MOS IC'S AND THEIR STATIC SENSITIVE DEVICES

Most integrated circuits are high impedance devices. This characteristic makes them susceptible to damage by electrostatic charges. Large electrostatic charges tend to build up in low humidity environments. If you provide a discharge path through the IC, you may damage the IC.

To prevent needless failures, employ these techniques when handling static-sensitive devices:

- Until circuit boards are ready for use, keep them in their static-protective packaging.
- Never remove or insert boards when the machine is under power.
- The correct board removal procedure is as follows:
  - When you're repairing equipment, it must be grounded.
  - Wear your anti-static wrist strap. Connect it to the equipment chassis or nearest available ground. (Field Service Kits include a wrist strap and grounding cord (0552-0032-01).
  - Neutralize static voltage differences! Touch the chassis, or any metal part of the equipment.
  - Always grasp the board from two opposite edges with your forefingers.
  - Place removed boards on a grounded static-dissipative mat (part of the field service kit).
- When inserting boards into the equipment:
  - Remove the board from the original packaging on static dissipative material. If you must ship a defective board, save packaging material for reuse.
  - Be sure to remove power from the tester. When installing the replacement board, following above steps.
  - Pack defective boards in a shielded bag. Return the bag in the reusable container.
- Packing IC chips, or other static-sensitive devices: Use conductive foam or an equivalent, anti-static material with adequate physical protection.
- Avoid unnecessary contact with internal components.
- Avoid setting boards on static-prone insulating surfaces such as paper, glass, rubber or plastic.
- Beware of static generated by friction when...
  - Wearing silk or nylon garments.
  - Walking on carpets.
  - Scuffing shoes with rubber soles.

NOTICE

Relative humidity has a direct effect on static charge buildup. As humidity decreases, static buildup usually increases.

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CHAPTER 1
AC/DC POWER DISTRIBUTION

AC/DC THEORY OF OPERATION

⚠ WARNING!

DANGEROUS HIGH VOLTAGES
ARE PRESENT IN THIS EQUIPMENT

Always use the "One Hand Rule" when working with AC voltages by keeping one hand in your pocket or behind your back. Before removing wires from the MRC-400/450, always verify that the Tester is "OFF". Turn off the Main Power Switch on the front panel and unplug the AC power cord from the AC outlet.

AC DISTRIBUTION

The primary voltage applies 110V, 60Hz AC to the MRC-400/450 via the hot side (Black Wire) of the AC power cable. The Main Power routes to one side of the "ON/OFF" Front Panel Power Switch/Circuit Breaker (15A). The hot wire continues to one side of the Line Filter. The common side routes to the other side of the Line Filter. The earth ground directly connects to the MRC-400/450 chassis.

With the unit connected to an AC source, AC is supplied to the ON/OFF Switch. With the Main Power Switch "ON", 110VAC routes to the following:

Line Filter (HOT/COMMON) Terminal Block (HOT/COMMON)
Transformer (HOT/COMMON) Relay Board (HOT)

Once **<POWER>** is pressed on the front panel, 110VAC is routed to the following:

Fans, Condenser (HOT) Heater Blanket (HOT) Circuit Boards

COMPRESSOR OPERATION

In the Recovery/Vacuum Mode, the Pump pulls a vacuum and evacuates refrigerant from the vehicle. The Plumbing Board activates Relay (K1) on the Relay Board that supplies 110VAC to the Thermal Overload Breaker (Klixon-Normally Closed). The AC is then routed to both windings (TOP PIN C), on the compressor. AC is then routed through the start and motor windings to pin 3 and pin 5 (Compressor Relay K1 coil). AC neutral line is connected to terminal "1" on K1 coil and to one side of the internal contact. Once the compressor builds up enough current, K1 coil will energize and close the contacts from pin 1 to pin 2. The suppression cap assembly is connected to terminal "1" and "2" to suppress noise on start up. The start capacitor produces a phase shift allowing the compressor to start. Once the compressor gets up to speed, the current through the motor windings will decrease and disengage K1. Once K1 is disengaged, the contacts will open and the AC neutral line will be removed from the start winding.

TRANSFORMER OPERATION

The transformer converts 110 volts AC down to 24 volts, 15 volts, and 5 volts AC. These AC lines are protected with three fuses. All three AC voltages are supplying power to the Processor Board at J4 pins 1 & 2, 3 & 4, 5 & 6. With the Main Power switch in the ON position, the Processor Board has power.

RELAY BOARD

A.C. voltage from the Main Power switch is applied directly to one side of the contacts on relay K1 and K2, located on the Relay Board. When the relays are energized, AC voltage is routed to the compressor through K1 and to the condenser fans and heater blanket through K2.

DC DISTRIBUTION

PROCESSOR BOARD

The Processor Board has three bridge rectifiers and one 5 volt regulator. D1 bridge rectifier converts 5 volts to 12VDC and supplies voltage to the 5 volt regulator. The 5 volts is used for the standard components and IC's for power. D2 bridge rectifier converts 15VAC to 15VDC and supplies voltage to the 15 volt regulator located on the Plumbing Board via J7 pin 1 to J1 pin 1. D3 bridge rectifier converts 24VAC to 24VDC and supplies voltage to the audible Alarm. The 24VDC supplies voltage to K1 and K2 on the Relay Board, Smart Drivers with Self Test for Solenoids on the Plumbing Board.

PLUMBING BOARD

The Plumbing Board has a 15VDC regulator, that is used to power the Ambient Temperature Sensor (built in the board), Load Cell (Scale), and external Temperature Probe (temperature of A/C system in car). The 15VDC regulator is powered by the unregulated 15VDC from D2 bridge rectifier located on the Processor Board. The 5VDC supplies voltage to the Transducers, and switches monitored by a pull up resistor on each line.

LCD BOARD

The LCD Board is powered by +5 VDC from the 5 volt regulator on the Processor Board. The +5VDC is derived from J2 pin 6 to J1 pin 6 on the LCD Board (left) and from J8 pin 6 to J1 pin 6 on the LCD Board (right).
LED Board.
The LED Board is powered by +5 VDC and +12 VDC supplied from the Processor Board. The +12VDC is used to power the LED's.

RELAY BOARD

The Relay Board has two 24 volt relays on it, K1 and K2. The +24VDC is derived from J12 pin 2 on the Plumbing Board. This 24 volts is supplied to both relay coils, through diodes. The output port IC. located on the Plumbing Board supplies a return path to complete the return side of K1 coil, so the relay is energized. When energized, the switch contacts will be closed allowing A.C. voltage to power the Fans and Heater Blanket. When the return side of K2 coil is completed, the relay is energized causing the switch contacts to be closed allowing A.C. voltage to power the compressor.

SOLENOID OPERATION

The solenoids are powered by +24VDC from D3 bridge rectifier. The +24VDC is derived from J1 pin 4. K1 allows the SOL GND to pass through the normally closed High Pressure Switch to Q2 emitter. Q2 is turned on with the +5VDC supply to connect the emitter to the collector side. The collector side is connected to the coil of K1 to allow the relay to close the contacts, that allows SOL GND to all solenoids.

LOAD CELL

The load cell is powered by +10 volt DC at J10 pin 2 & 7, supplied from the +15 volt circuit. The load cell is a device that measures weight.

AMBIENT TEMPERATURE

The Ambient Temperature is powered by +15 volt DC. This sensor is built into the Plumbing board.

EXTERNAL TEMPERATURE PROBE

The Temperature Probe is powered by +15 volt DC through J9 pin 1. Temperature Probe is used to measure the temperature in the vehicle.

ALARM

The alarm is powered by the 24 volt DC voltage at J1 pin1. A beeper driver is used to sound the alarm when the buttons are pressed, or if an error code is displayed.

HIGH/LOW/PURGE PRESSURE TRANSDUCER

The Pressure Transducers are powered by +5 volt DC through J11 pin 1, 6, & 11 on the Plumbing Board. These transducers are used to monitor pressure and vacuum readings on the vehicle or the Recovery Tank.

NORMALLY OPEN SWITCHES

The switches are supplied power by +5 volt pull-up resistors on J2 pins 9, 7, 11, J3 pins 1, 5, & 7. Once a switch is closed, the switch will have zero volts on both sides of the switch. When the switch re-opens then +5 volts will be on one side of the switch and ground on the other.

RECOVERY TANK SWITCHES

The Recovery Tank has a float assembly inside of the tank to determine the level of refrigerant. The lower float is normally open and has a 5 volt pull up resistor via J2 pin 5 to monitor the status of the float. The upper float is normally closed and also has a 5 volt pull up resistor via J2 pin 1 to monitor the status of the float.

CHECK OUT PROCEDURE

There is not a calibration procedure for the Plumbing Board or the Display/Control Board. The only thing available is a quick voltage check.

TRANSFORMER CHECK OUT PROCEDURE

1. Using a DVM in AC mode, connect both leads across J4 pins 1 and 2. Voltage reading should be≈5 to 8 volts AC.
2. Connect both leads across J4 pins 3 and 4. Voltage reading should be≈15 to 20 volts AC.
3. Connect both leads across J4 pins 7 and 8. Voltage reading should≈20 to 24 volts AC.

NOTE: ***If the above voltage readings are not correct, disconnect J4 from Processor Board and try again. If voltages are still out of range, replace Transformer***

PROCESSOR BOARD CHECK OUT PROCEDURE

1. Using a DVM in DC mode, connect the BLACK lead to ground on the board.
2. Connect the RED lead to J2 pin 6. Voltage reading should be≈5 volts ±0.05 volts.
3. Connect the RED lead to J5 pin 5. Voltage reading should be≈12 volts ±1 volt.
4. Connect the RED lead to J7 pin 1. Voltage reading should be≈15 volts ±1 volt.
5. Connect the RED lead to J1 pin 1. Voltage reading should be≈24 volts ±1 volt.

PLUMBING BOARD CHECK OUT PROCEDURE

1. Using a DVM in DC mode, connect the BLACK lead to ground on the board. (SP-3)
2. Connect the RED lead to J9 pin 1. Voltage reading should be≈15 volts ±0.05 volts.
3. Connect the RED lead to J10 pin 2. Voltage reading should be≈10 volts ±0.05 volts.

NOTE: IF THE VOLTAGES ARE NOT CORRECT REMOVE CONNECTORS FROM PCB & TRY AGAIN.

TROUBLESHOOTING

COMPLAINT	CORRECTIVE ACTION
I. Machine will not power up.	Is the machine plugged in and rear panel switch on? • Plug machine in and turn on. Is 110VAC present at the power strip • Check wall receptacle. • Check ON/OFF/circuit breaker. • Check Power Cord. Does 24 VAC transformer output read 24VAC ± 2VAC ? • Replace Transformer. Are voltages present at J4 on Processor Board? Refer to Transformer Check Out Procedure on Page 1-3. • Replace fuse on power supply. • Replace Processor board. • Replace board causing load.
II. ERROR 4	Perform Solenoid Diagnostic Test with front panel power switch OFF, rear ON. Activate by pressing Down arrow and Power buttons at same time. (Refer to Chapter 3.)
III. ¼ Amp Fuse Blowing.	Electrical noise from pump can cause symptom. Add R14, 22 ohm, 3 watt resistor (0684-0686-04) to compressor filter cap. See Service Bulletin #717.
IV. No Fan, No Compressor.	Checkout Circuit breaker ON/OFF switch and Relay Board.
V. No Beep, unit functioning properly.	Check for 24 volts DC at Beeper. If OK, change Processor Board. (See Functional Block Diagram).

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MAIN POWER SWITCH
CIRCUIT BREAKER

AC PLUG
HOT
GND
NEUTRAL

RV2
RV3
LINE FILTER
RV1

TB1
T1 TRANSFORMER
BLK/WHT
BLK/YEL
BLK
BRN/WHT
BRN/YEL
BRN
RED
BLUE
ORANGE
F1
F2
F3

J4
15VAC
5VAC
24VAC

+15VDC
+12VDC
+24VDC
D2
D1
D3

PROCESSOR BD.
7001-2188-01

SOL. GND
+15V
+5V
+12V
VI
VO
GND

BEEP DRIVER
ALARM

JUMPER BLOCK
LCD BD. 7001-2153-01 (LEFT)
U1 LCD DRIVER
LCD BD. 7001-2153-01 (RIGHT)

LED BOARD
7001-2159-01
U1
U2
U3
U4
R1-R15
D1-D15
LED*

HEATER BLANKET
FAN
NEU
HOT
NEUTRAL

COMPRESSOR ASSY.
PROTECTOR
C
S
M
K1
C1
C2
R1

RELAY BD.
7001-2230-01
K1
K2
D1
D2

FAN*/HEATER*
+24VDC
PUMP*
OUTPUT PORT
PUMP SENSE

SMART DRIVERS WITH SELF TEST
INPUT PORT

S9 VIRGIN
S10 RECOVERY
S8 OIL
S7 X-OVER
S6 VACUUM
S5 SS
S1 CONDENSOR
S4 BYPASS
S11 LIQUID
S2 PURGE
S3 ZERO
SPARE
GND

HIGH PRESS. SW.
N/U
EXTERNAL TEMPERATURE PROBE
1.1K OHM
INTERNAL HARNESS
AMBIENT TEMP.
Q2

PULL UP

HIGH PRESSURE TRANSDUCER
LOW PRESSURE TRANSDUCER
PURGE PRESSURE TRANSDUCER
SS PRESSURE SWITCH
SS FLOAT SWITCH
LAMP +5 VOLTS
SUCTION SEPARATOR SERVICE SWITCH
RECOVERY TANK NOT FULL*
RECOVERY TANK EMPTY
OIL ON
VIRGIN ON
RECOVERY ON
RECOVERY TANK
LOAD CELL
GRN
BLU
BLK
BRN
SHEILD

COMPRESSOR RESISTANCE CHECK: (WITHOUT RELAY)

C to S = 8 ohms
C to M = 4 ohms (1/2 of C to S)
S to M = 12 ohms (CS + CM)

C1 = START CAP
C2 & R1 = SUPPRESSION CAP ASSY.

K1 = COMPRESSOR RELAY
PIN 5 ON RELAY CONNECTED TO MOTOR WINDING ON BACK SIDE

S1-S6, S8-S11 NORMALLY CLOSED
S7 NORMALLY OPEN

HIGH PRESSURE SWITCH
NORMALLY CLOSED
OPENS AT 450 psi
CLOSES AT 375 psi

SS PRESSURE SWITCH
NORMALLY OPEN
CLOSES AT 20 psi
OPENS AT 10 psi

SS FLOAT SWITCH
NORMALLY OPEN
CLOSES AT 10oz. OF OIL

SS SERVICE SWITCH
NORMALLY OPEN
CLOSES WHEN DEPRESSED

RECOVERY TANK
UPPER FLOAT
NORMALLY CLOSED
OPENS WHEN TANK IS FULL

LOWER FLOAT
NORMALLY OPEN
CLOSES AROUND 6 lbs. OF REFRIGERANT

OIL SWITCH
NORMALLY OPEN
CLOSES WHEN TANK IS INSTALLED

VIRGIN SWITCH
NORMALLY OPEN
CLOSES WHEN TANK IS INSTALLED

RECOVERY SWITCH
NORMALLY OPEN
CLOSES WHEN TANK IS INSTALLED

SUN ELECTRIC CORPORATION
One Sun Parkway
Crystal Lake, Illinois 60014 U.S.A.

MODEL: MRC-400/450	DWG REV: 0695 REV A.
DWG BY: T. WILSON	CHK BY: F. ZOFINSKI & T. WILSON

TITLE:
SERIAL "A"
AC/DC DISTRIBUTION

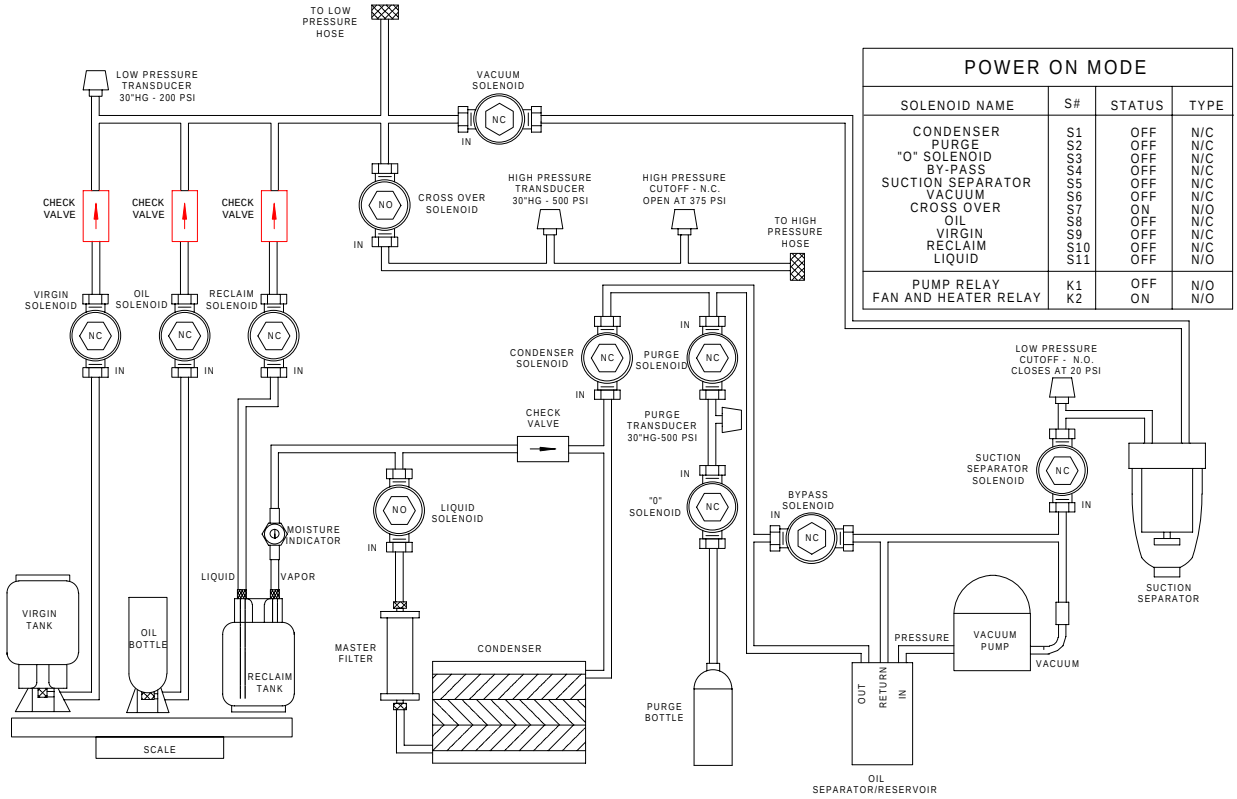
DWG:	PAGE:
1-1	1-5/6

CHAPTER 2
THEORY OF OPERATION

OPERATING MODES FOR SERIAL "A"

POWER ON MODE

The Power On Mode is activated by turning on the Main Power switch located on back of the unit; one short beep is sounded. Then press the front panel **<POWER>,** for 3 seconds; a beep is sounded. When the MRC-400/450 is turned "ON", all segments on both displays will be ON. The software Rev. number will be displayed for about 3 seconds. The Liquid and Crossover solenoids will be powered and closed (N.O. solenoids). K2 on the Relay Board will also be energized, turning on the Fans and Heater.
The Heater Blanket is used to heat the virgin tank. Increasing the temperature of the tank raises the pressure in the tank, thus providing a quicker charge rate. The nominal operating temperature for the blanket is 120°F ±10°. A temperature regulator is built into the heater and is not intended to be serviced.



POWER ON MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
PURGE	S2	OFF	N/C
"O" SOLENOID	S3	OFF	N/C
BY-PASS	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSS OVER	S7	ON	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECLAIM	S10	OFF	N/C
LIQUID	S11	OFF	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-1 POWER ON MODE

AUTO SEQUENCE MODE

In this Mode the MRC-400/450 will automatically recover the system, recycle the refrigerant , evacuate, check the system for leaks, and recharge the system. The operator enters the Auto Sequence Mode by first depressing **<AUTO SEQUENCE>,** at which time the "VACUUM TIME", "AUTO SEQUENCE" and the "HOLD" lights will turn ON. The operator will then:

1. Press and hold the **<VALUE ADJUST>** until the specified "VACUUM TIME" is indicated on the right display.
2. Press the **<HOLD/ENTER/RESTART>** to enter that number.
3. Repeat steps 1 and 2 for entering the "HOLD TIME" and the "CHARGE AMOUNT". To take the unit out of the "HOLD" state, and activate the "AUTO SEQUENCE" test, press **<HOLD/ENTER/RESTART>**. For more information, refer to the "AUTO SEQUENCE FLOW CHART" in appendix E of the Operator's Manual.

RECLAIM LOW, HIGH MODES

NOTE: *Only in the discussion of the Reclaim Cycle will the purpose and operation of individual components be discussed. It is recommended that in reading the following material, the Pneumatic and Functional Block diagrams be used as a reference.*

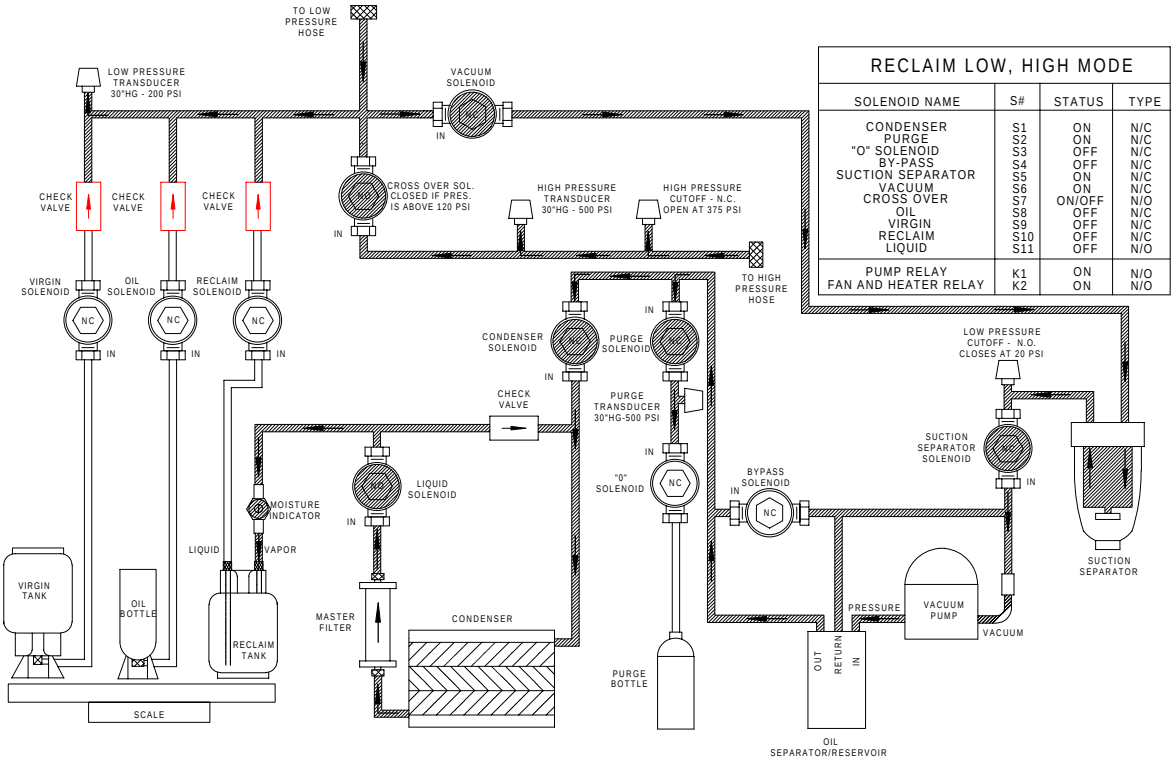
In the Reclaim Cycle, Vacuum, Condenser, Liquid, Purge and Suction Separator solenoids are OPEN, and the Vacuum Pump, Fans and Heater will be ON. With High and Low pressure hoses connected to the vehicle being serviced, the MRC-400/450 will attempt to recover refrigerant through both hoses. If the pressure in the high pressure hose, which is being monitored by the High Pressure Transducer, exceeds 120 psi**,** then the Crossover Solenoid will be CLOSED**,** RECLAIM HIGH mode. Crossover Solenoid is OPENED if the discharge pressure is less than 110 psi. This is also controlled by temperature, below 60º Crossover Solenoid is CLOSED, RECLAIM HIGH. The Pump runs until the suction and discharge pressure are both less than 4 inches of vacuum (4 hg)**,** if software is less then 2.08**.** 2.08 software and above, vacuum is pulled to 15 inches (15 hg). The system then waits approx. 2 minutes (depending on ambient temperature) for a rise in pressure, in order to boil off any residual refrigerant. If no rise in pressure occurs the system will beep twice and the Green "COMPLETED" LED on the Control Panel will be lit.

The low and high pressure transducers monitor the pressures when connected to a vehicle. These transducers output a voltage proportional to the amount of pressure being sensed. The suction side transducer outputs .00025 (.25 millivolts) per psi and the discharge and purge transducers output .0001 (.1 millivolt) per psi. **(EXAMPLE: LOW : 70PSI IS EQUAL TO .0175V. HIGH 70PSI IS EQUAL TO .007V.)** Since most field equipment cannot measure such low voltages, the amplified signal would have to be measured on the plumbing board. (See page 3-2 Transducer Checkout Procedure)

As the recovered refrigerant flows through the low and high sides and into the Vacuum solenoid to the Suction Separator, the Vacuum solenoid is being pulsed to control the amount of refrigerant going into the Suction Separator bowl. This helps prevent frost/liquid build up in the Suction Separator bowl, and reduces the amount of oil being discharged from the vehicle. Pulsing of the Vacuum solenoid will be activated when pressure in Suction Separator bowl is above 20 psi (OFF) and below 10 psi. (ON).

NOTE: *Pulsing of the Vacuum solenoid does not lengthen reclaim time.*

RECLAIM LOW, HIGH MODES continue...



RECLAIM LOW, HIGH MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	ON	N/C
PURGE	S2	ON	N/C
"O" SOLENOID	S3	OFF	N/C
BY-PASS	S4	OFF	N/C
SUCTION SEPARATOR	S5	ON	N/C
VACUUM	S6	ON	N/C
CROSS OVER	S7	ON/OFF	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECLAIM	S10	OFF	N/C
LIQUID	S11	OFF	N/O
PUMP RELAY	K1	ON	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-2 RECOVERY LOW, HIGH MODE

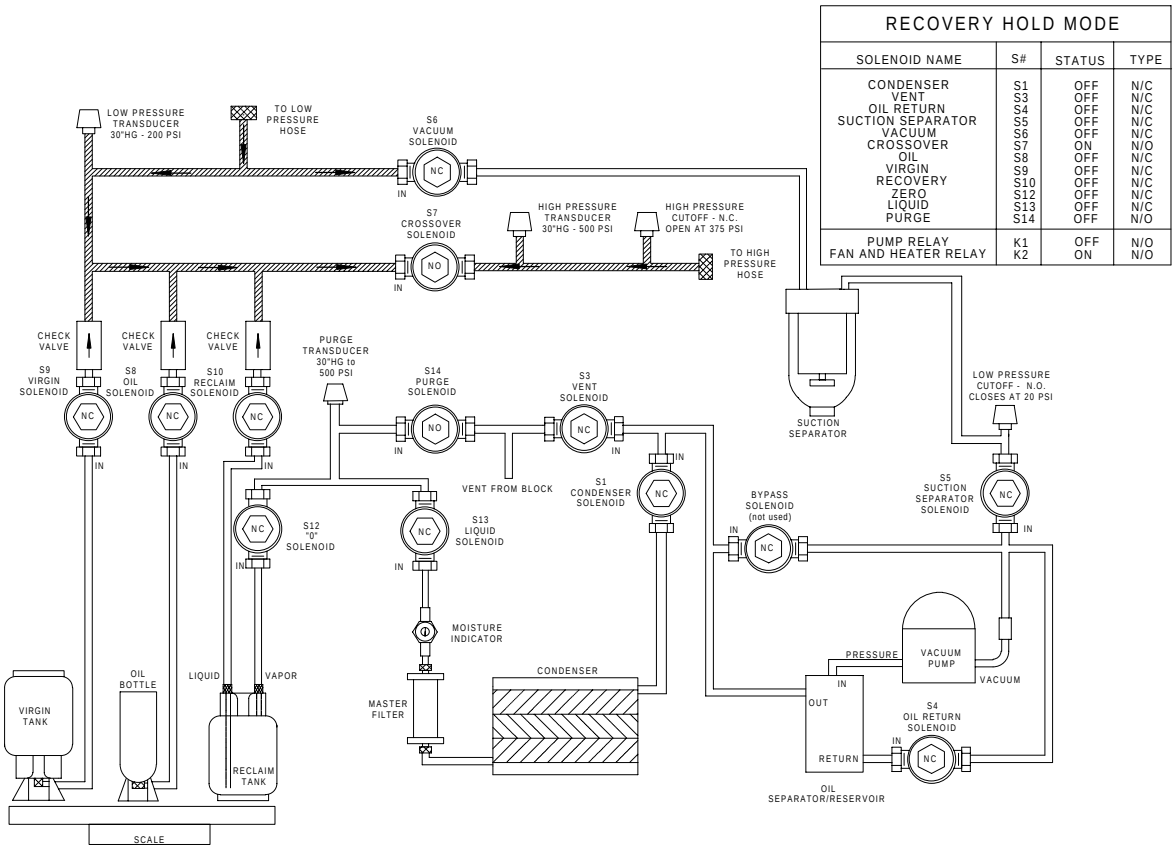
The Desiccant bag in the Suction Separator is designed to be the first stage in removing moisture from the refrigerant. As refrigerant enters the Suction Separator any Oil and solids separate and remain in the bowl. The refrigerant vapor is then pulled from the Suction Separator bowl by the compressor, which pressurizes it as it passes through the Oil Separator / Reservoir. Inside the Oil Separator / Reservoir, at the port marked "Inlet", is a ten micron filter that sits at the top of the Reservoir (NOT INTENDED TO BE CHANGED). The recovered gas passes through this filter before it exits. Oil in the refrigerant from the compressor will settle at the bottom of the Oil Separator Reservoir.

The bottom half of the Oil Separator / Reservoir is filled with 13 ounces of oil. A ball float OPENS and CLOSES a needle valve that controls the flow of oil from the Oil Separator / Reservoir to the Vacuum Pump. The recovered refrigerant passes from the Oil Separator / Reservoir to the Condenser and Purge solenoids, which are OPEN. The Purge solenoid is OPENED so the Purge Transducer can monitor pressure at this point. If it exceeds calculated Purge pressure due to non-condensable (Air), it will cause the Zero solenoid to OPEN, causing a Purge of these non-condensable from the system. Purge Pressure is based on Ambient Temperature. (See Table on Page 2-6).

As the refrigerant vapor passes through the Condenser solenoid, the recovered gas flows through the Condenser where it is cooled and converted to a liquid. The liquid then enters the Master Filter / Dryer. This Filter / Dryer contains a internal 10 micron filter on the inlet and outlet with desiccant between the two filters. This is the last step to remove any moisture or other impurities. The recycled refrigerant flows through the Liquid solenoid to the Moisture Indicator. The Moisture Indicator, located on the bottom left hand front corner of the machine, will indicate if there is any moisture in the recycled refrigerant. This is located in the lower section due to water is heavier than refrigerant. Finally the recovered recycled refrigerant will empty into the vapor side of the reclaim tank.

RECLAIM HOLD MODE

In Reclaim Hold, only the Purge solenoid is ON, allowing the Purge Transducer to maintain constant readings. The Heater, Fans and Vacuum Pump are OFF. In this cycle the MRC-400/450 will hold a vacuum between 30 and 170 seconds, depending on ambient temperature. This is to determine if there may be residual refrigerant still in the system. During this time, if suction or discharge pressure exceeds **2 psi,** the Pump is started. The unit enters reclaim until both the suction and discharge pressure are below 4 inches of vacuum **(4 hg),** if software is less then 2.08**.** 2.08 software and above, vacuum is pulled to 15 inches (**15 hg**). Both displays will show continuous measurements for the high and low sides. At the end of this cycle the unit will proceed to the next cycle.

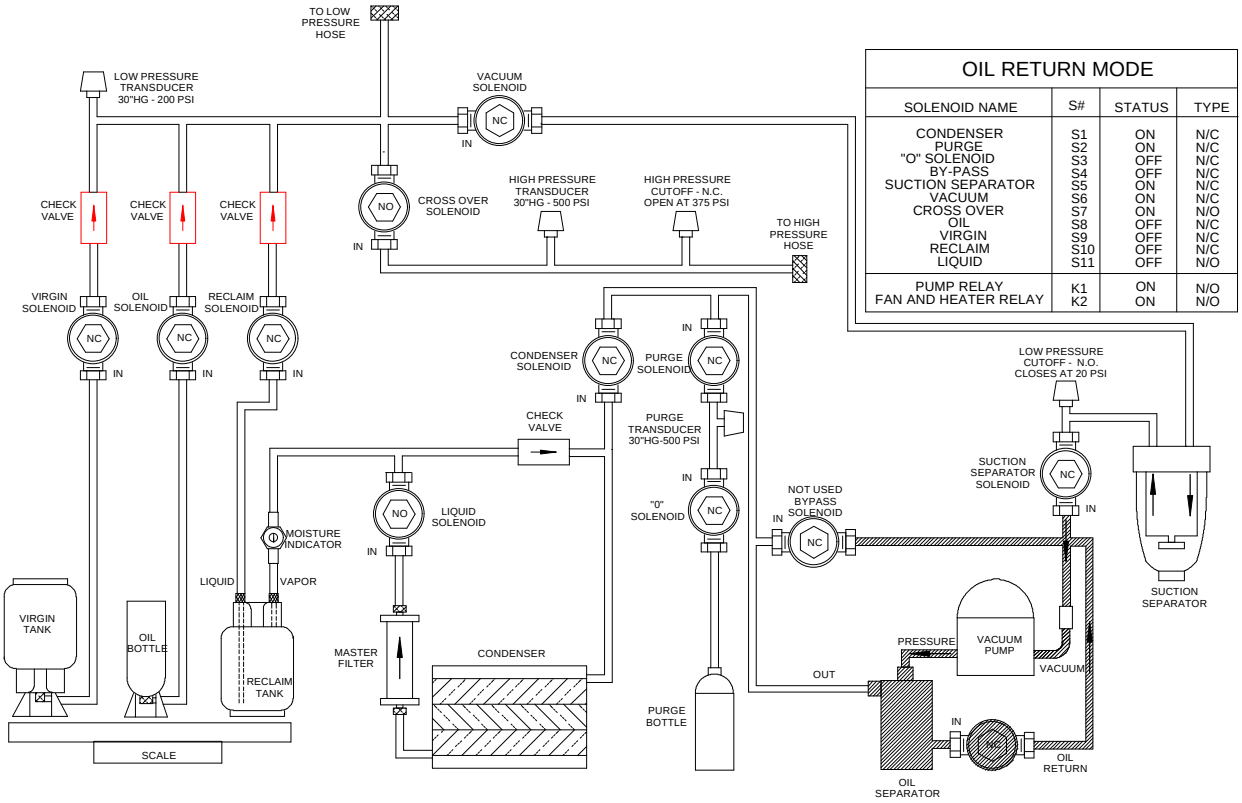


RECOVERY HOLD MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
VENT	S3	OFF	N/C
OIL RETURN	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSSOVER	S7	ON	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECOVERY	S10	OFF	N/C
ZERO	S12	OFF	N/C
LIQUID	S13	OFF	N/C
PURGE	S14	OFF	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-3 RECOVERY HOLD MODE

OIL RETURN MODE

As the compressor functions, small amounts of oil is carried off with the compressed refrigerant. This oil is collected in the Oil Separator. Every time the pump cycle ends the unit will energize (open) the Oil Return solenoid for 5 seconds. This allows any oil to flow back to the Vacuum side of the pump. This operation will keep the correct amount of oil in the pump for the most effective method of cooling and lubrication. At the beginning of the Vacuum cycle this solenoid is open again for 5 seconds. Oil Separator does not require any oil. (Requires 1.21 software).



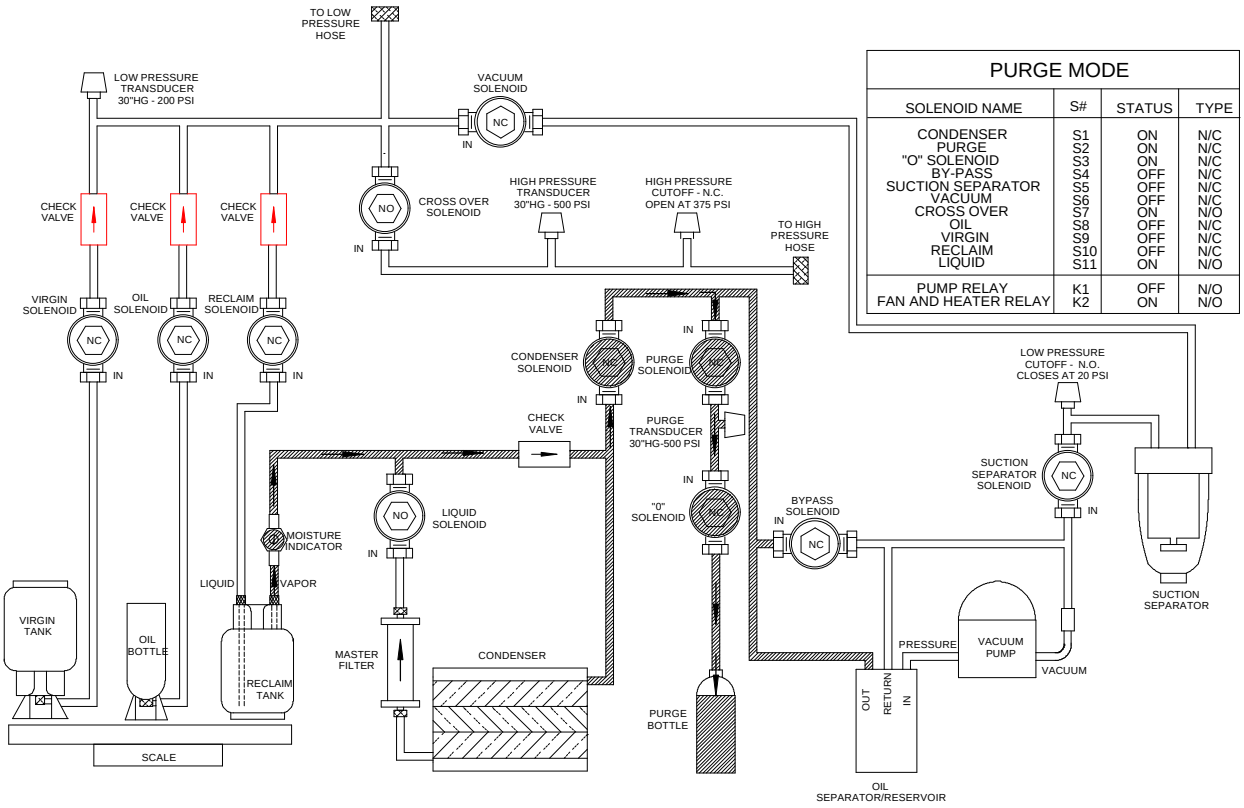
OIL RETURN MODE

SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	ON	N/C
PURGE	S2	ON	N/C
"O" SOLENOID	S3	OFF	N/C
BY-PASS	S4	OFF	N/C
SUCTION SEPARATOR	S5	ON	N/C
VACUUM	S6	ON	N/C
CROSS OVER	S7	ON	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECLAIM	S10	OFF	N/C
LIQUID	S11	OFF	N/O
PUMP RELAY	K1	ON	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-4 OIL RETURN MODE

PURGE MODE

The purpose of the Purge cycle is to remove non-condensables (Air) from the Recovery Tank. Purge can activate at any time during the Recovery cycle. During the Recovery the Purge solenoid is open so the Purge transducer can monitor the system pressure. At the start of a Purge Cycle there is a moment were the unit compares the pressure in the recovery tank to the temperature sensor on the Plumbing board. The unit will then prepare to Purge by CLOSING the Liquid solenoid and OPENING the Condenser solenoid. The Zero solenoid OPEN's, allowing the non-condensables to be released into the Purge Bottle for a short period of time. The Fans and Heater are ON for the entire Purge cycle.



PURGE MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	ON	N/C
PURGE	S2	ON	N/C
"O" SOLENOID	S3	ON	N/C
BY-PASS	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSS OVER	S7	ON	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECLAIM	S10	OFF	N/C
LIQUID	S11	ON	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-5 PURGE MODE

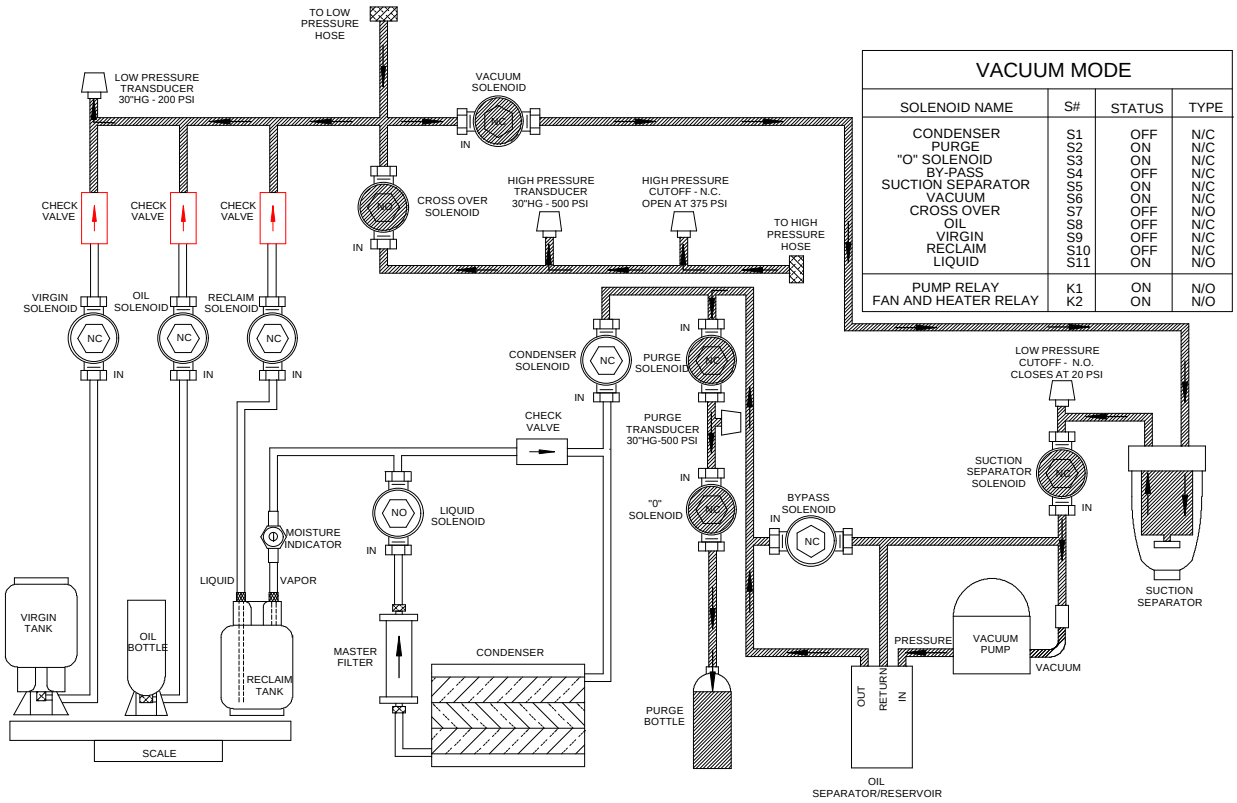
Small amounts of oil, carried by the air, may be collected in the Purge Bottle with the sudden release of pressure. The amount of pressure lost during the Purge Cycle depends on the amount of time that the unit purges. (Time vs. Pressure)

PURGE PRESSURE CHART

Ambient Temperature in (F)	Purge Pressure in (PSIG)	Ambient Temperature in (F)	Purge Pressure in (PSIG)
50	72	110	186
60	88	120	212
70	104	130	240
80	120	140	272
90	140	150	306
100	162	160	342

VACUUM MODE

During this cycle the Vacuum, Crossover, Suction Separator, Purge and Zero solenoids are OPEN. The Compressor, Heater and Fans are also ON. The unit will pull a deep vacuum for the amount of time, up to 95 minutes, entered by the operator during programming setup. During this time both displays will show continuous vacuum (hg) measurements for the high and low sides.



VACUUM MODE

SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
PURGE	S2	ON	N/C
"O" SOLENOID	S3	ON	N/C
BY-PASS	S4	OFF	N/C
SUCTION SEPARATOR	S5	ON	N/C
VACUUM	S6	ON	N/C
CROSS OVER	S7	OFF	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECLAIM	S10	OFF	N/C
LIQUID	S11	ON	N/O
PUMP RELAY	K1	ON	N/O
FAN AND HEATER RELAY	K2	ON	N/O

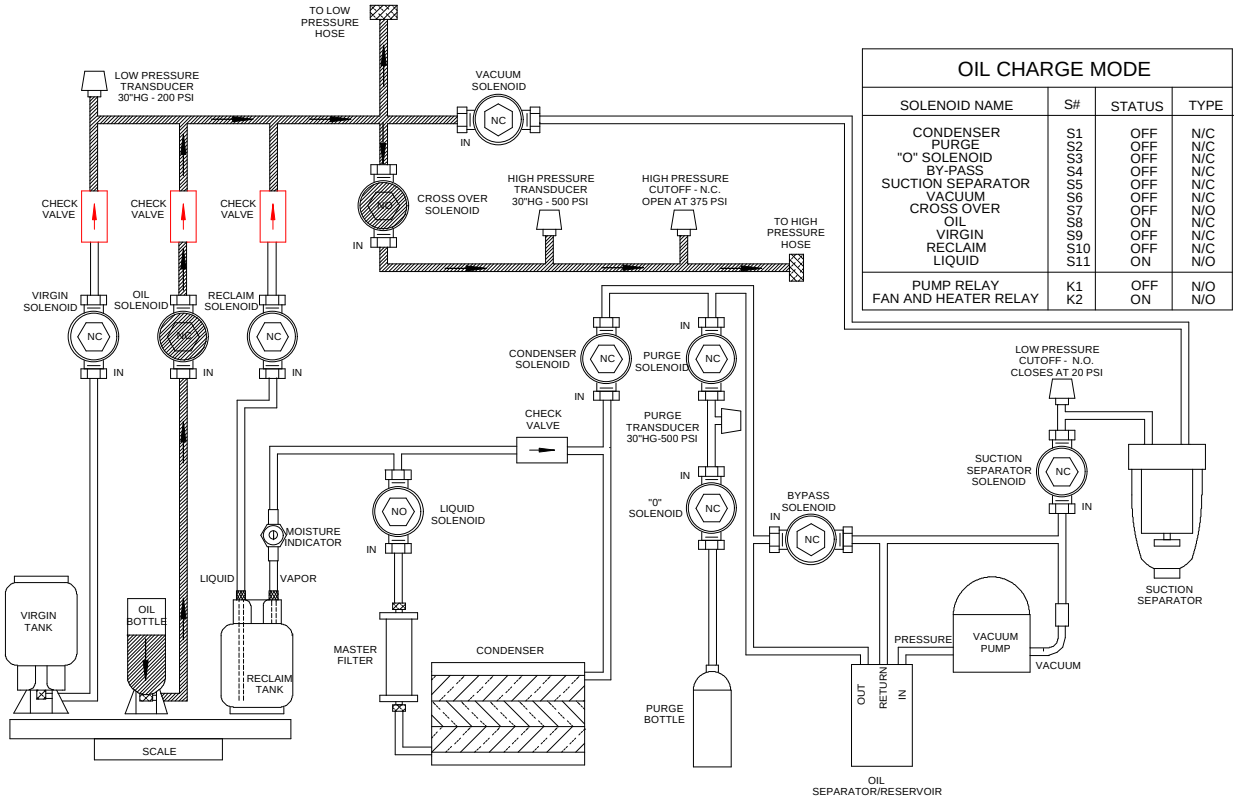
FIGURE 2-6 VACUUM MODE

VACUUM HOLD MODE

NO FIGURE SHOWN: After the Vacuum cycle, the MRC-400/450 will hold a vacuum for the time, up to 95 minutes, entered by the operator during programming setup. The Liquid and Crossover solenoids are CLOSED, while the compressor is OFF. Also the Heater and Fans are ON for the entire cycle. During this time the left display shows time remaining (in minutes) and the right display shows the continuous vacuum being held in the vehicle. This continues until the entered time has expired, or the vacuum drops out of tolerance level which is 2 inches of mercury. If the vacuum drops below the tolerance level, a beeper will alert the technician and the HOLD LED will turn ON. The vacuum loss indicates a leak in the vehicle or an incomplete reclaim (vacuum time was not set long enough to boil all of the residual refrigerant out of the vehicle). The technician can cancel the operation at this time and repair the system.

OIL CHARGE MODE

The Liquid solenoid is CLOSED, the Oil and Crossover solenoids are OPENED and oil from the Oil Bottle is dispensed into the system until the scale voltage indicates the correct weight has been dispensed. The amount of oil, entered into the unit by the operator, depends on the requirements of the vehicle being serviced. The dispensed oil is measured in fluid ounces and is indicated on the LCD display on the right.
The LCD display to the left displays the word "OIL". Oil will always be dispensed before refrigerant; if no refrigerant is programmed, oil will **NOT** be dispensed.



OIL CHARGE MODE

SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
PURGE	S2	OFF	N/C
"O" SOLENOID	S3	OFF	N/C
BY-PASS	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSS OVER	S7	OFF	N/O
OIL	S8	ON	N/C
VIRGIN	S9	OFF	N/C
RECLAIM	S10	OFF	N/C
LIQUID	S11	ON	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-7 OIL CHARGE MODE

RECOVERED CHARGE MODE

In this cycle the Liquid solenoid is CLOSED and the Reclaim and Crossover solenoids are OPEN. The Reclaim solenoid is open until the scale indicates to the LCD display that the correct amount (entered by the operator) of refrigerant is dispensed or until the Reclaimed Refrigerant Float Switch OPENS. When this happens unit will automatically switch over to dispense remaining amount of Virgin refrigerant through S9. The Reclaim solenoid will close and the Virgin solenoid will open until amount entered is charged.

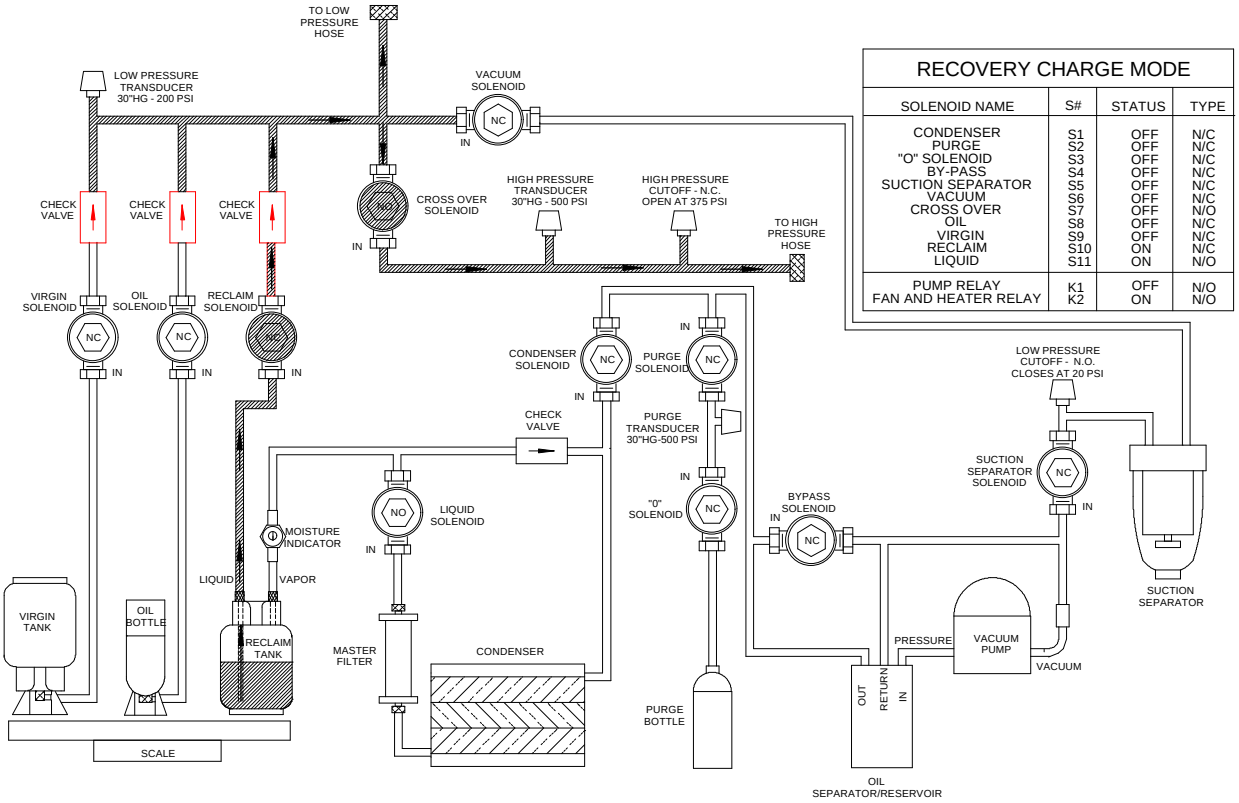
The Crossover Solenoid is temperature and pressure controlled, it should be OPEN when:

> *The discharge pressure is less than 80psi and Ambient temperature is greater than 64 degrees fahrenheit.*

The Crossover Solenoid is CLOSED when:

> *The discharge pressure is greater than 90psi or Ambient temperature is less than 59 degrees fahrenheit*

NOTE: *The above theory on the crossover solenoid is in reference to R-12; different refrigerants have different pressures.*



RECOVERY CHARGE MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
PURGE	S2	OFF	N/C
"O" SOLENOID	S3	OFF	N/C
BY-PASS	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSS OVER	S7	OFF	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECLAIM	S10	ON	N/C
LIQUID	S11	ON	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-8 RECOVERY TANK CHARGE MODE

VIRGIN CHARGE MODE

In this cycle the Liquid solenoid is CLOSED and the Virgin and Crossover solenoids are OPEN. The Virgin solenoid is open until the scale indicates the correct amount (entered by the operator) has been dispensed and the LCD display indicates that the charge has completed.

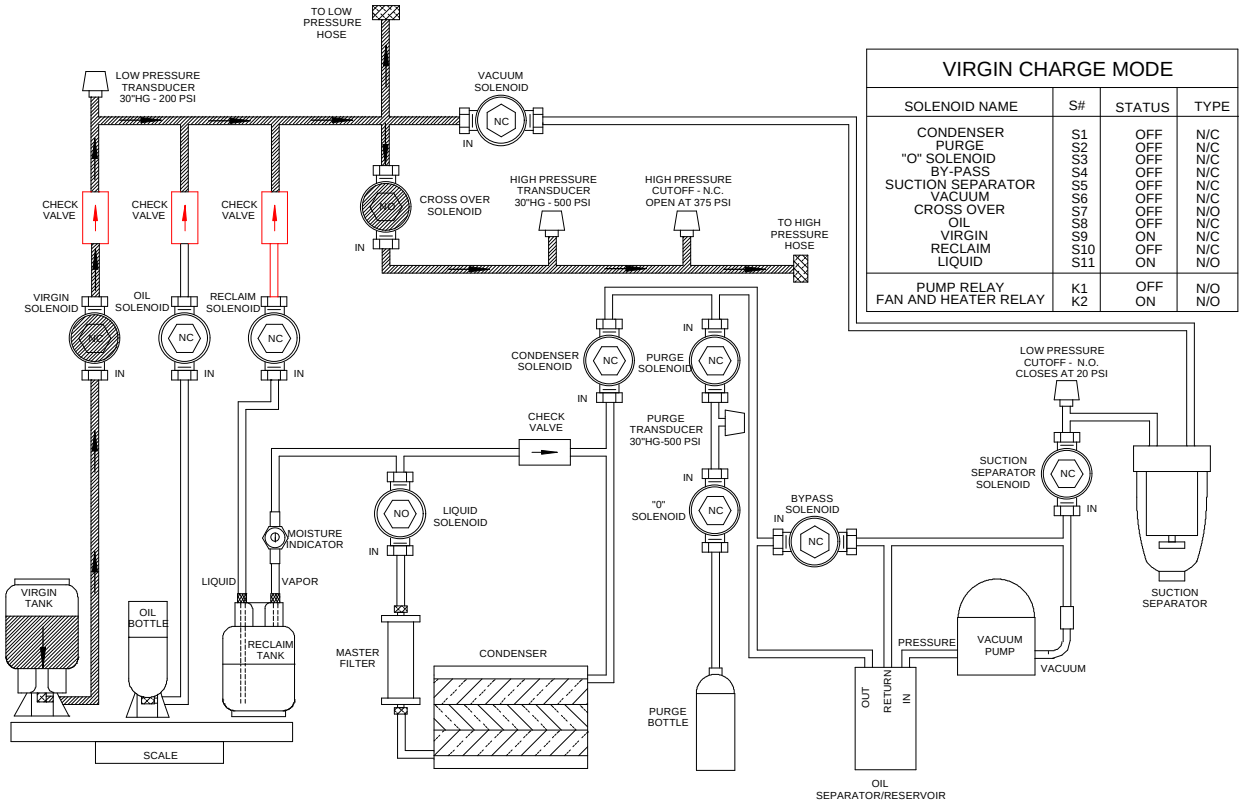
The Crossover Solenoid is temperature and pressure controlled, it should be OPEN when:

> *The discharge pressure is less than 80psi and Ambient temperature is greater than 64 degrees fahrenheit.*

The Crossover Solenoid is CLOSED when:

> *The discharge pressure is greater than 90psi or Ambient temperature is less than 59 degrees fahrenheit*

NOTE: *The above theory on the crossover solenoid is in reference to R-12; different refrigerants have different pressures.*



VIRGIN CHARGE MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
PURGE	S2	OFF	N/C
"O" SOLENOID	S3	OFF	N/C
BY-PASS	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSS OVER	S7	OFF	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	ON	N/C
RECLAIM	S10	OFF	N/C
LIQUID	S11	ON	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-9 VIRGIN CHARGE MODE

SUCTION SEPARATOR MODE

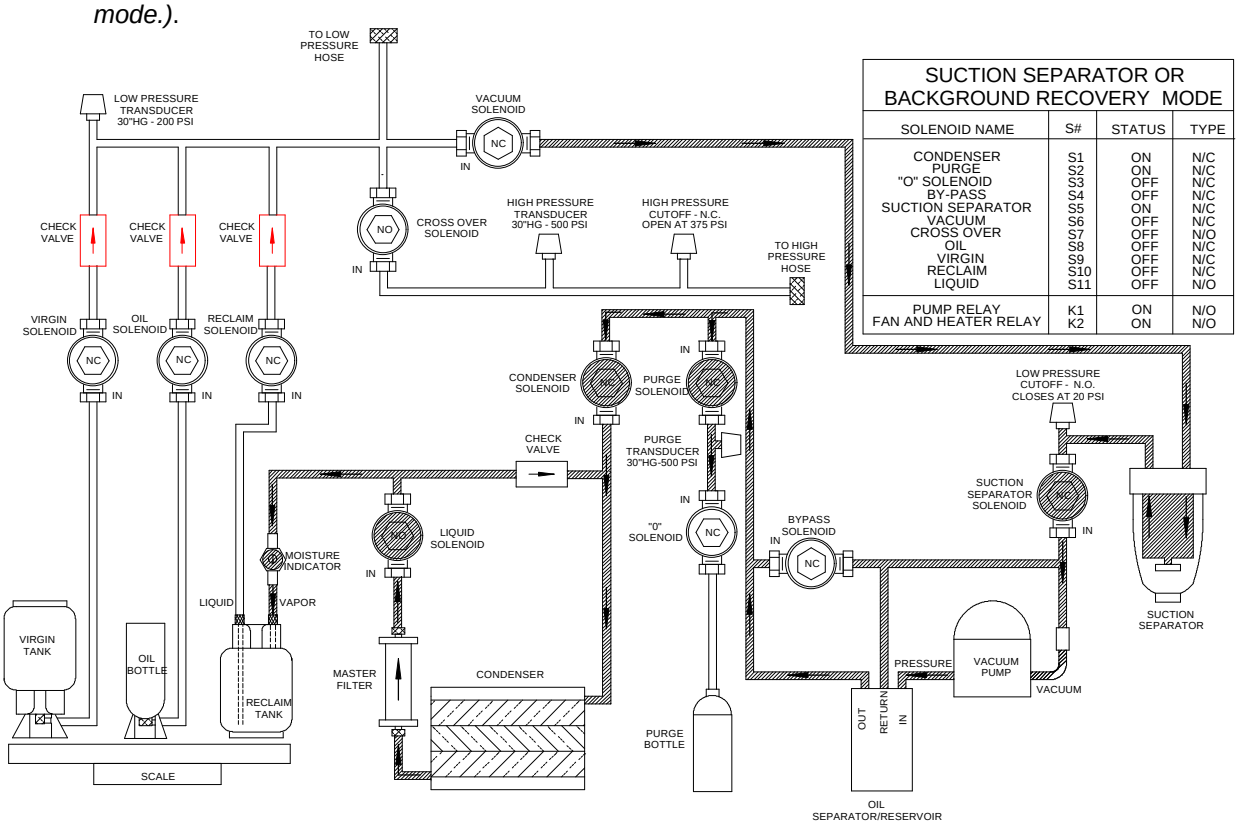
The Suction Separator cycle can be activated either by the Suction Separator Bowl filling with Oil or Refrigerant to the point where the Suction Separator Float Switch is activated or by pressing the red switch by the Suction Separator Bowl. In this cycle the Float switch in the Suction Separator Bowl will close and activate when raised. When this occurs the**MRC-400/450**will beep three times, display 'SUC SEP" and the "HOLD" light on the front panel will be lit. The Suction Separator, Purge, Condenser, and Liquid solenoids will OPEN . The Fans, Heater and Compressor will be ON at this time. After a 5 minute deep Reclaim, the system will beep twice and the pressure on the Suction Separator Bowl will have been drawn to the Reclaim Tank. The red switch near the Suction Separator Bowl will light.

With the Bowl removed and the Oil disposed of properly, the Suction Separator Float Switch can be reset by lifting and holding the Float Switch UP until the unit beeps twice and the red light near the Suction Separator Bowl will turn OFF. Releasing the float causes the unit to beep twice and turn the red light back on. With the Bowl replaced, press **<HOLD/ENTER/RESTART>**to reset and restart the MRC-400/450. This will also turn OFF the red light near the Suction Separator Bowl.

BACKGROUND RECLAIM MODE

This cycle is triggered by a rise in pressure in the Suction Separator Bowl. Suction Separator light flashes. Unit enters Reclaim mode with Vacuum solenoid ON, until Bowl pressure dissipates. Requires no operator intervention and could cause the operator to think this is an erratic operation

NOTE: *(Refer to appendix A of this manual for further details on updates and changes regarding this mode.)*.



SUCTION SEPARATOR OR BACKGROUND RECOVERY MODE

SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	ON	N/C
PURGE	S2	ON	N/C
"O" SOLENOID	S3	OFF	N/C
BY-PASS	S4	OFF	N/C
SUCTION SEPARATOR	S5	ON	N/C
VACUUM	S6	OFF	N/C
CROSS OVER	S7	OFF	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECLAIM	S10	OFF	N/C
LIQUID	S11	OFF	N/O
PUMP RELAY	K1	ON	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-10 SUCTION SEPARATOR OR BACKGROUND MODE

TROUBLESHOOTING

	COMPLAINT	CORRECTIVE ACTION
I.	**Error Code 0. Internal CPU memory failure.**	Check for loose connections on wiring harnesses between PCB'S. Replace Processor CPU Board.
II.	**Error Code 1. Communication bus failure.**	Check for loose connections on wiring harnesses between PCB'S.
III.	**Error Code 2. Tank full.**	The Tank Full LED should be lit on front panel. If not check for proper connection of the reclaim tank float cord that attaches to the Reclaim Tank. Charge from the Reclaim Tank. Replace full Reclaim Tank with new prepped tank.
IV.	**Error Code 3. Software failure.**	Replace Processor CPU board. Or software I.C.
V.	**Error Code 4. Solenoid driver failure.**	Confirm solenoid driver failure by performing the SDiagnostic Solenoid Test (Page 3-3). If test does not flag a certain solenoid, then; replace Plumbing Board. If Diagnostic solenoid test flags S9 (409), check High Pressure switch.
VI.	**Error Code 5. No pressure at Purge Transducer 30 seconds after the pump starts.**	Verify Pump is running. Check for leak on discharge side of pump between pump and purge solenoid. Check wiring to Purge Tranducer. Verify that the Purge Solenoid has voltage and is opening so the Purge transducer can sense pressure. Verfiy that the Bypass Solenoid is not stuck in the open position. Verfiy that the Temprite float inside the return port is not stuck open. This will cause a closed loop situation between the Temprite and the pump. (Temprite checkout procedure on page 3-7)
VII.	**Error Code 6. Pump failure.**	Check oil level in the Pump/Temprite. Confirm voltage from Pump Relay through Klixon Overload protector. If voltage is ok at pump winding then replace pump.

COMPLAINT		CORRECTIVE ACTION
VIII.	**Error Code 7. No weight drop from scaleduring refrigerant charge.**	• Start the vehicle. • If charging from the Virgin Tank, verify that the Heater blanket is ON. • Verify that the unit is recognizing a weight for the bottle that is being charged from by pressing **<AMOUNT>**. • Remove shipping bolts and check for debris blocking scale. • Verify that the valve and anti-blowback on the bottle that is being used are open. • Verify that the In-line filter on the bottle being used is not clogged with debris. • Verify that voltage is supplied to the Charge Solenoid for the bottle being used. • Verify that the Schrader valves on the vehicle are being fully depressed.
IX.	**Error Code 8. No weight dropdurring Oil charge.**	• Verify that the unit is recognizing the weight of the Oil cylinder by pressing **<AMOUNT>**. If weight reading is zero but oil is present, reset Oil cylinder bracket on scale and wait for 2 beeps. • If Oil cylinder is empty, replace with new cylinder. • Verify that the oil charge solenoid is getting voltage. • Verify that the oil charge solenoid is physically working and there is no debris in it that might restrict flow. • When charging oil, the operator must have a refrigerant amount already programmed in the **<Auto Sequence>** mode or the unit will not have the option to charge oil.
X.	**Error Code 9. Weight amount stored in memory does not agree with weight presently on scale.**	• Remove everything from scale. Turn rear Power switch OFF. Wait a few seconds and power up unit. Then reinstall everything on scale, making sure to hear two beeps after each item on scale is replaced. Check by pressing **<AMOUNT>**.
XI.	**Error Code 10. Present Scale weight less than 2 lbs.**	• Perform Scale calibration on page 3-2 of this manual. • Replace load cell. • If load is more then 155, reduce weight.
XII.	**Error Code 11. Present Scale weight is greater than 155 LBS.**	• Perform Scale Calibration on page 3-5 of this manual. • Replace load cell.

COMPLAINT	CORRECTIVE ACTION
XIII. Error Code 12. Tank Full and Tank Empty lights are on at the same time.	• Verify that the Reclaim Tank Float Cord is connected properly. • Verify proper operation of float cord by ohming out the pins on the cord. • Possible float inside tank is sticking. Reclaim and evacuate tank. Turn tank upside down and confirm both lights are on. Remove float assemble from tank and repair. • Replace tank.
XIV. Error Code 13. Present High side pressure is less than 30 HG.	• Check 1/4 amp fuse. • Perform Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-2 of this manual. Replace if necessary. • Replace PLumbing board.
XV. Error Code 14. Present High side pressure is greater than 200PSI.	• Perform Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-9 of this manual. Replace if necessary. • Replace PLumbing board.
XVI. Error Code 15. Present Low side pressure is less than 30 HG.	• Perform Zero Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-2 of this manual. Replace if necessary. • Replace PLumbing board.
XVII. Error Code 16. Present Low side pressure is greater than 200PSI.	• Perform Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-2 of this manual. Replace if necessary. • Replace Plumbing board.
XVIII. Error Code 17. Present Purge pressure is less than 30 HG.	• Perform Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-2 of this manual. Replace if necessary. • Replace Plumbing board.

COMPLAINT	CORRECTIVE ACTION
XIX. Error Code 18. Present Purge pressure is greater than 500 PSI.	• Perform Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-2 of this manual. Replace if necessary. • Replace Plumbing board.
XX. Error Code 19. No Reclaim tank present.	• Verify that Reclaim tank is depressing switch and being recognized by unit. Press **<AMOUNT>**. • Check appendix A,(A-1) For Dip switch configuration #4. • Remove and replace Reclaim tank making sure to wait for 2 beeps. • Verify wiring and operation is correct on the switch behind the reclaim tank on the scale (Center tab not used). • Verify wiring connection on the load Cell of the scale and also where the Load Cell connects to the Plumbing board. Replace Load Cell if necessary. Replace Plumbing board if necessary.
XXI. Error Code 20. No vacuum in new Reclaim tank.	• When installing a new Reclaim tank, it first must be prepped by pulling a 15 minute vacuum on it. • Pull a 15 minute vacuum on your service bottle and attach the units red and blue Reclaim tank hoses to the vacuumed service bottle. Install customers Reclaim tank and wait for 2 beeps. Disconnect hoses from the service bottle and reconnect to customers tank.
XXII. Error Code 21. No vacuum in hold after evacution.	• Disconnect the unit from the vehicle and pull a vacuum on the unit with the charge hose hand valves CLOSED to verify the unit is not leaking. Repair leaks if necessary. If unit holds fine, then automobile system is leaking. • Verify that Charge solenoids are not leaking refrigerant into the units system. In the Power On Mode with no functions engaged with the charge hose hand valves CLOSED, see if pressure rises on the Low side LCD on its own. If pressure rises, repair leaking solenoid. • Verify that operator has pulled a minimum of 30 minutes of vacuum on the vehicle being serviced. This will ensure that no residual refrigerant is left in the vehicle system that could cause a rise in pressure.

COMPLAINT	CORRECTIVE ACTION
XXIII. Error Code 22. Vacuum loss greater than 2" HG in Hold.	• Press **<Cancel>** to verify that the vacuum has actually dropped more than 2 HG. If not, Unplug heater blanket and try again. (See Service Bulletin 713 for noise effecting transducer). • Close vehicle adapters or inline Ball valves and disconnect hoses from vehicle. Recover any pressure, and program unit for 5 min. Vacuum and 5 min. Hold. If unit passes test, the problem is in the vehicle or vehicle adapters. (To test R-134a vehicle adapters use service coupler 7009-2492-01). • Close virgin valve. If display indicates pressure, recover it. Once completed monitor the displays for around 4 to 5 minutes. If displays increase in pressure, problem is in the recovery tank charge solenoid. Repeat test open virgin valve and close the blue recovery tank valve. Replace or rebuild manifold block..
XXIV. Error Code 23. Present ambient temperature is less than 32° F.	• Verify the temperature is within operating specs. The units operating temperature range is 50º F to 120º F. • Press <Power> and <Up> at the same time. Then press the <Up> key. The right LCD will show ambient temperature. Verify that it is within operating specs and matches the correct ambient temperature of the day. If it does not match the temperature of the day, replace ambient temperature sensor strap on recovery tank. On early models without temperature sensor on strap, replace Plumbing board.
XXV. Error Code 24. Present ambient temperture is greater than 150° F.	• Turn power off and let cool. • Disconnect temperature probe and try again. • If temperature sensor is OK, this error code can arbitrarily come up when the Mux A/D is confused. Check connections to and from scale. Shorted load cell.
XXVI. Error Code 25. Discharge temperature less than 20° F.	• Connect temperature probe or replace probe unless probe is really that cold, or probe is not connected.
XXVII. Error Code 26. Discharge temperature greater than 150 F.	• Replace temperature probe or cool probe.
XXVIII. Error Code 27. Incorrect refrigerant switch settings.	• See setup instructions or Appendix A-1.
XXIX. Error Code 28. High pressure switch on.	• Reduce high pressure. Activates at 375 PSI. Turn A/C off. • Check switch for continuity.

COMPLAINT	CORRECTIVE ACTION
XXX. Error Code 29. No refrigerant tanks charging.	• Install a R-12 tank, or confirm straps are tight against switch. • Check wiring to switch on rear of scale. • If switch is ok check Plumbing board.
XXXI. Error Code 30. No oil tank available for charging.	• Install cylinder and bracket as one piece.

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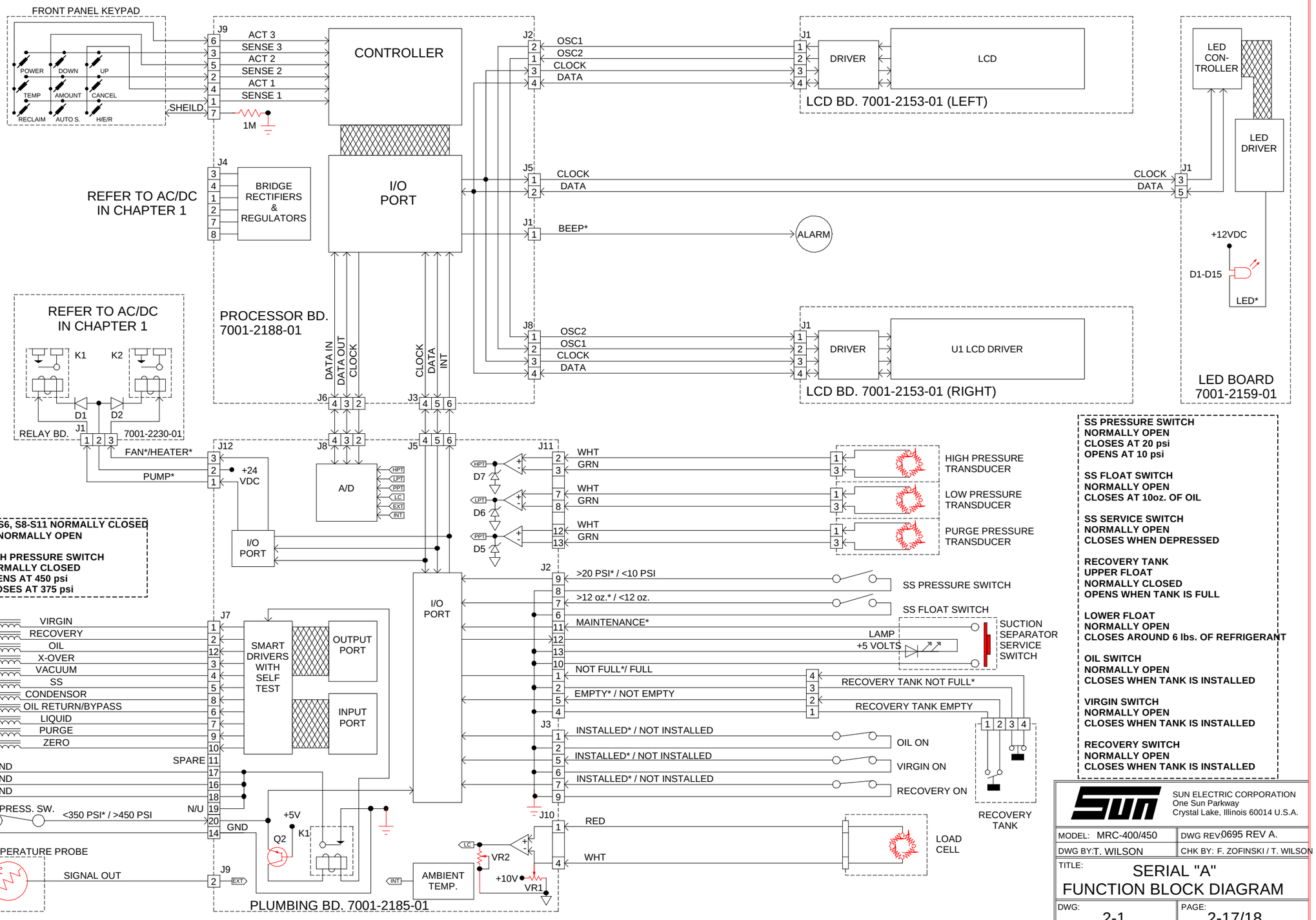

SUN ELECTRIC CORPORATION
One Sun Parkway
Crystal Lake, Illinois 60014 U.S.A.

MODEL: MRC-400/450	DWG REV: 0695 REV A.
DWG BY: T. WILSON	CHK BY: F. ZOFINSKI / T. WILSON

TITLE:
SERIAL "A" FUNCTION BLOCK DIAGRAM

DWG:	PAGE:
2-1	2-17/18

CHAPTER 3
CHECKOUT-CALIBRATION-MAINTENANCE PROCEDURES

CHECKOUT PROCEDURES

⚠ WARNING!

USE STANDARD REFRIGERANT HANDLING
SAFETY PROCEDURES WHEN PERFORMING INSTALLATION

ALWAYS WEAR SAFETY GOGGLES, DON'T SPILL OR TOUCH
LIQUID REFRIGERANT, AVOID FLAMES, AND EXCESSIVE HEAT.
USE ONLY IN WELL VENTILATED AREA.

SYSTEM TEST PROCEDURE

NOTE: ***THIS PROCEDURE WILL CHECK OUT THE MAJORITY OF THE UNIT WITHOUT THE REQUIREMENT FOR HOOK UP TO A VEHICLE.***

1. Shut down unit by turning front panel ON/OFF button OFF.
2. Turn off Recovery tank valves and remove Vapor hose from RECOVERY tank.
3. Connect vapor hose to Red vehicle High side hose. High side will display pressure. (MRC-450 uses yellow utility hose)
4. With Low side hose connected open hand valve. (MRC-450, remove Low side vehicle adapter).
5. Turn unit on and program unit to "RECLAIM ONLY".
6. Low side will display vacuum until it reaches about 4” or 5", where the pump will shut off. If pump turns on and off when appropriate, then transducers are correctly adjusted and unit is operating correctly.
7. When pump restarts plug low side hose with your thumb to seal system and create a Vacuum.

NOTE: *If high side does not increase it will most likely be a restriction, troubleshoot per unit purging.*

TEST COMPLETE

PUMP CHECKOUT PROCEDURE

To start and run properly, the vacuum pump requires a properly grounded 115VAC voltage supply with sufficient current carrying capacity. If possible, avoid extension cords. However, if you must use one, it must be at least 18 AWG and not over 10 feet long.
To confirm operation:

1. Turn on unit and confirm hand valves are closed.
2. Press Auto sequence.
3. Enter time for vacuum only and activate by continuing to press the **<HOLD/ENTER/RESTART>**
4. Pump will start and displays will show amount of vacuum in "hg".
5. Cancel operation once pump is confirmed operating.

If the pump doesn't start, ensure that the above requirements are confirmed; then see Troubleshooting in Chapter 2.

TEST COMPLETE

CHECKOUT CHARGE AND RECLAIM PLUMBING

1. Close both hand valves at the end of the hoses.
2. Turn on the unit and in the Auto sequence, program 4 ounces (0 LB's 4 oz.) of refrigerant. Wait and watch the displays; the unit should hold the pressure. If not, use leak detector to find leak.
3. Press **<RECLAIM>**; allow unit to operate.
4. Wait and watch the displays; the unit should decrease the pressure until 4-6 inches is displayed. If it looses vacuum check reclaim hose fittings.

CHECKOUT COMPLETE

TRANSDUCER CHECKOUT PROCEDURE

TOOLS REQUIRED: DVM

Transducers output a voltage proportional to amount of pressure they sense. The suction side transducer outputs .00025 (.25 millivolts) per psi and the discharge and purge transducers output .0001 (.1millivolt) per psi. At atmosphere, zero pressure, the transducers output voltage is .5 volts D.C. This amplified voltage can be measured at the cathode of diodes on the plumbing board. (Diodes are located in upper right corner of Plumbing board when installed in unit) To confirm transducers are functioning properly follow procedure below to measure .5 volts.

(PROCEDURE BELOW USES EXAMPLE ON LOW PRESSURE TRANSDUCER)

1. Reclaim any pressure on hoses. Open hand valves or disconnect hoses from rear of unit.
2. Connect DVM red lead to cathode of diode.
   (D5 = Purge transducer / D6 = Low transducer D7 = High transducer)
3. Connect DVM black lead to SP3, (Top Center)
4. DVM should read .550 volts D.C. plus or minus .05 volts. If not change transducer. (May vary with altitude.)
5. With 70 psi on displays: (D5 = 1.102 volts / D6 = 2.349 volts / D7 = 1.238 volts).
   NOTE: *DIODE D5 VOLTAGE MAY BE DIFFERENT DUE TO AMOUNT OF AIR IN SYSTEM.*

CHECKOUT COMPLETE

SERVICE SUB PAGE, (Raw Scale Weight, Purge Pressure & Temperature).

1. Press the **<UP>** arrow and the **<POWER>** at the same time.
2. This will display entire scale weight readings live. Press **<UP>** to toggle between Purge pressure and temperature.
3. Press **<DOWN>** to exit.

TANK INSTALLATION (ERROR CODE 9)

1. Remove all tanks from scale with Power on (Including Oil bracket). Turn off unit from rear panel switch.
2. Wait 10 seconds and turn on rear panel power switch. Turn on front panel power switch.
3. Wait for 2 beeps. (Indicating stable scale reading) Carefully install Reclaim tank. Wait for 2 beeps.
4. Carefully install Virgin tank. Wait for 2 beeps. Carefully install Oil cylinder with bracket. Wait for 2 beeps.
5. To confirm press **<AMOUNT>** for each tank. Correct amount for each tank should be displayed.

CHECKOUT COMPLETE

R134a VEHICLE ADAPTERS CHECKOUT PROCEDURE

TOOLS REQUIRED: R134a Service Coupler used to test vehicle adapters P/N 7009-2492-01

1. Connect vehicle adapters to block and open valves.
2. Program 5 minutes of Vacuum and Hold.
3. Do they leak? Repair leak or replace adapter.

CHECKOUT COMPLETE

SOLENOID DIAGNOSTICS (ELECTRIC)

PREREQUISITES:

Both tanks must have refrigerant. The MRC-400/450 has built in diagnostics to test the electrical portion of the unit. Each solenoid is controlled by a "SMART DRIVER". These drivers can detect an open or a short. When self diagnostics is performed and a solenoid is defective the number representing that device will be displayed following the number 4. **EXAMPLE:** Err. 405, the 5 represents solenoid S5, the 4 represents an electric problem with the block. On the next page is a list of solenoid descriptions.

DIAGNOSTIC SOLENOID TEST; TO ACTIVATE W/POWER ON:

NOTE: ***ON POWERED UP, IF ERROR 4XX APPEARS; ACTIVATE TEST W/FRONT PANEL POWER OFF***

1. Press **<DOWN ARROW>** and **<POWER>** at the same time, "self diag" is displayed and test is in process.
2. Once completed "ELEC PASS", "PASS PASS" or failure code will be displayed. If solenoid is shorted, on power up ERR-4 will be displayed. Perform same test with front panel power off to find solenoid.

SOLENOID VALVES	DESCRIPTION
401. Condenser	S1
402. Purge	S2
403. Zero	S3
404. Bypass/Oil Return	S4
405. Suction Sep.	S5
406. Vacuum	S6
407. Crossover	S7
408. Oil	S8
409. Virgin	S9
410. Reclaim	S10
411. Liquid	S11

CHECKOUT COMPLETE

FLOW TEST DIAGNOSTICS (ELECTRIC)

PREREQUISITES:

Flow test (Displayed: "Flow resr", t looks like r, due to segments on displays) was designed to enable testing of pneumatics. With the hand valves closed a small amount of refrigerant is allowed to escape from both tanks and reclaimed by the unit.
This slug of refrigerant goes through the Vacuum solenoid into the Suction Separator turns into a vapor and is reclaimed by the pump. The vacuum pump sucks the vapor through the system into the condenser where it returns to a liquid and flows into the Reclaim tank. As this function flows the transducers monitor the process, if pressures are not read or are stopped by a restriction the test will fail and an error code exhibited.

FLOW TEST:

1. Open both tanks with refrigerant and close hand valves. (450, not connected to vehicle)
2. Press the **<UP ARROW>** while "ELEC PASS" is displayed once Self Test has completed W/power on. (SEE APPENDIX "F" FOR ERROR CODES)

CAUTION: ***DO NOT PRESS DOWN ARROW THIS WILL ENTER A MANUFACTURES SUB TEST TO OPEN ALL SOLENOIDS, WITH SOFTWARE 1.10 OR UNDER.***

FLOW TEST THEORY OF OPERATION WITH ERROR CODES:

3. Unit looks at Virgin tank switch, if tank is present OK. If not **NO VIR 1** is displayed.
4. Unit looks at Oil switch, if oil cylinder is present OK. If not, **NO OIL 2** is displayed.
5. Unit looks at Reclaim tank switch to see if tank is present. If not, **NO RECLM 3** is displayed.
6. Unit runs reclaim to ensure system is capped off.
7. Suction Separator switch is monitored with vacuum solenoid opened during Reclaim. Switch should not close. If it does, **511** is displayed.
8. Unit looks at Reclaim tank switch to see if tank is present. If not, **500** is displayed.
9. Unit looks at Virgin tank switch to see if tank is present. If not, **501** will be displayed.
10. As test procedure continues, pump is started and the Vacuum and Suction Separator solenoids are powered/opened. Test is timed. If vacuum does not increase to 15" within 7 minutes, then vacuum pump did not move gas through system and **502** will be displayed.

NOTE: ***IF RECLAIM EMPTY LIGHT IS ON THIS WILL FAIL DUE TO NOT ENOUGH REFRIGERANT***

11. As pump vacuums system the Low and High transducers react producing low voltages; the unit expects these changes. If Low pressure transducer does not react **503** or if High pressure transducer does not react, **504** is displayed.
12. Next voltage is applied to Virgin solenoid S9. The solenoid is opened for a moment allowing the Low pressure transducer to sense 30 psi or greater. If no pressure is sensed, **505** is displayed.
13. Voltage is applied to Reclaim solenoid S10. The solenoid is opened for a moment allowing the Low pressure transducer to sense 30 psi or greater. If no pressure is sensed, **506** is displayed.
14. Voltage is applied to Oil solenoid S8. The solenoid is open for a moment allowing the low pressure transducer to sense an increase. If no pressure is sensed, **507** is displayed.
15. While this pressure is present the Crossover solenoid S7 is closed and more pressure is released. The pressure on the Low and High transducers are compared. The Low pressure transducer should be 30 psi higher. If not, **508** will be displayed.
16. Now the Crossover solenoid S7 is opened. Expecting pressure to increase. If no rise in pressure is attained, **509** will be displayed.

FLOW TEST DIAGNOSTIC continued...

17. Vacuumed solenoid S6 is opened. Low pressure switch should sense greater then 20 psi. If not, unit displays **510**.
18. Suction Separator solenoid is opened. Low pressure switch should closed, pressure drop. If not, **512** is displayed.
19. Refrigerant is vacuumed in through the pump and pushed out under pressure. Bypass solenoid is opened and pressure should decrease. If not, **513** is displayed.
20. Purge solenoid is opened and pressure should increase at the purge transducer from refrigerant/pump. If not, then pressure is not there and **514** is displayed.
21. Condenser solenoid is opened, purge transducer pressure should decrease. If not, **515** is displayed.
22. As refrigerant continues through Liquid solenoid purge transducer pressure is monitored. If a decrease does not occur then, **516** is displayed.

CALIBRATION PROCEDURES

SCALE CALIBRATION

TOOLS REQUIRED: 50 LB's OF WEIGHTS IN QUANTITIES OF 10 LB.

NOTE: ***ONCE IN SERVICE PAGE, TO EXIT, PRESS THE <DOWN> .***

1. Shutoff the valves on the tanks and remove everything from of the scale, including the oil bracket.
2. Press up-arrow and power buttons at the same time to access "Raw scale weight". Left display shows pounds; right display shows ounces.

NOTE: ***PRESS UP-ARROW TO TOGGLE BETWEEN RAW SCALE WEIGHT AND PURGE TRANSDUCER PRESSURE.***

3. Place 10 lb. weight on scale, adjust VR1 on the Plumbing board (7001-2185-01) for 10.30 lb. on left display. (positive readings could be effected if zero should drift negative, so we added 3 to 12 oz. to compensate, offset can be as high as 12 oz. confirm linearity by adding 10 pounds before adjusting)
4. Add remaining 40 lb. weight on scale, adjust VR2 on the Plumbing board for 50.30 LB on left display
5. Repeat steps 3 and 4 until unit displays correct reading on both steps with out any adjusting. Remove weights.
6. Press **<DOWN>** to exit.
7. Reinstall tanks, wait for two beeps each time tank is installed.
8. Screw oil bracket and cylinder in place, wait for 2 beeps.

CALIBRATION COMPLETE

TEMPERATURE PROBE CALIBRATION

Calibration is done through software, this software adjustment compensates for the added resistance of the cable compared to the ambient temperature sensor in the unit. This calibration is performed during the unit calibration. This also zero's the Low and High transducers.

CALIBRATION COMPLETE

RECLAIM TANK PROCEDURE FOR ADJUSTING ZERO W/REFRIGERANT IN TANK

TOOLS REQUIRED: Reclaim Tank (empty = 16.5 lb.)

NOTE: ***NOT REQUIRED WHEN REV. 1.13 OR HIGHER SOFTWARE IS PRESENT. IF THE RECLAIM TANK IS REMOVED FROM THE SCALE WHILE POWER IS ON, UNIT WILL ZERO THE AMOUNT OF REFRIGERANT IN THE TANK.***

1. Unit off. Remove Reclaim Tank from scale and set next to unit with hoses still attached.
2. Set empty Reclaim Tank on scale.
3. Close hand valves, turn unit on and Program 3 ounces of refrigerant to charge hoses.
4. RECLAIM amount in hoses, as soon as Reclaim starts remove empty tank. Error code 19 will be displayed, wait for two beeps, put partially filled tank back on scale and CANCEL out Error code and resume reclaim by pressing **<HOLD/ENTER/RESTART>**. To the unit it appears as if it reclaimed quantity in tank plus 3 ounces.

CALIBRATION COMPLETE

TRANSDUCER CALIBRATION

NOTE: UNIT CAN NOT ENTER CALIBRATION IF TRANSDUCERS SENSE PRESSURE. If Transducers have drifted into PSI, program Vacuum to bring reading down into VACUUM.

NOTE: IF UNIT WAS PREVIOUSLY USED, RECLAIM ON HOSES WILL HAVE TO BE PERFORMED.

1. With software version 1.09 and 1.10 place dip switch #4 to the "OFF" position (Setup Only) on the Processor board. (UNDER FRONT PANEL) Connect temperature probe to four pin connector on rear panel.
2. Open the hand valves (Allows transducers to be at atmospheric pressure). On R134a units remove hoses from rear ports.
3. Turn on unit. Press and hold **<HOLD/ENTER/RESTART>** for five seconds, "CAL" should be on both displays.
4. Press **<RECLAIM>**; observe that the "IN PROGRESS" LED is flashing and the "HOLD" LED is on. To activate test press the **<HOLD/ENTER/RESTART> .**
5. The "COMPLETED" LED will be on and displays will show "0PSI".

CALIBRATION COMPLETE

MAINTENANCE PROCEDURES

TEMPRITE/OIL RESERVOIR CHECKOUT PROCEDURE

Tools Required: Dip Stick (Make out of coat hanger wire) / OIL PART NUMBER: 0681-0179-02

1. Reclaim any pressure in hoses; once completed remove the output hose from temprite.
2. Insert dip stick and confirm oil level quantity. (2.5 inches / 13 ounces)
3. Program 5 minutes of vacuum, while pump is running confirm air pressure is escaping from Out port of Tempright. If not change temprite.

NOTE: ***IF OIL LEVEL IS EXTREMELY LOW CHECK FOR EXCESS OIL IN PUMP,***

CHECKOUT COMPLETE

PROCEDURE FOR CHANGING OIL / OIL SHOULD BE CHANGED EVERY 90 DAYS

OIL RESERVOIR MAINTENANCE

This procedure is in reference to the large Temprite oil reservoir. The small reservoir does not require oil maintenance since it does not contain any oil. The oil level in the reservoir should be checked whenever a failure such as a leak in the plumbing, excessive purging occurs or compressor is whining.

NOTE: *Release pressure in the system by entering the S. S. mode; activate by pressing the red switch by the suction separator bowl.*

1. Place the Power Switch in the "ON" position.
2. Close the hand valves at the end of both service hoses.
3. Press **<RECLAIM ONLY>**.
4. When the green status LED lights, turn POWER OFF. Unplug the MRC from the grounded 110 volt outlet.
5. Remove the two screws under the front lip of the control panel. Lift up the control panel.

⚠ WARNING!

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SAFETY PROCEDURES WHEN PERFORMING INSTALLATION

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LIQUID REFRIGERANT, AVOID FLAMES, AND EXCESSIVE HEAT.
USE ONLY IN WELL VENTILATED AREA.

6. Remove the three (3) hoses attached to the pump oil reservoir.
7. Remove the nut that secures the oil reservoir to the bottom of the shelf and remove oil reservoir.
8. Invert the reservoir and empty the oil via the "OUTPUT" fitting into an approved container in accordance with Local, State and Federal regulations that may apply in your area.
9. Disconnect hoses to compressor. Remove four bolts securing pump to unit.
10. Tip and pour oil out of compressor. Refill with 10 ounces of new oil.
11. Using a small funnel, pour 13 oz. of recommended compressor oil into the outlet port of the reservoir. 13 oz. of oil will measure 2-1/2" on the dip stick.

OIL RESERVOIR MAINTENANCE continue...

12. Carefully reinstall the oil reservoir and pump onto the shelf in the cabinet. Secure with the hardware previously removed.
13. Reconnect the yellow hose to the "OIL" port, red hose from compressor to "INLET" port and red hose from pneumatic block to "OUTLET" port.
14. Lower control panel and reconnect the two screws removed in step 5.

CALIBRATION COMPLETE

PUMP MAINTENANCE

PUMP PROCEDURE (CHANGING OIL)

1. Unplug unit from A. C. outlet.
2. Remove 2 bolts in front securing top. Lift top. Remove hoses attached to pump.
3. Remove bolts securing pump, and remove pump from unit.
4. Using a container to catch the oil tip pump over so oil drips out of port. (This procedure can take awhile)
5. Once completed install pump back into unit. Reconnect electrical contacts.
6. Connect hose to Vacuum port, disconnect other end.
7. Put 10 oz. of oil into a container, insert hose connected to vacuum port.
8. Plug in unit and turn on. Program 5 minutes of vacuum and 0 for all other entries. This will have the compressor vacuum in the oil.

ALTERNATIVE IS TO USE A SECOND VACUUM SOURCE AND DRAW OUT THE OIL.

TOOLS: Vacuum Pump, Thin hose, Oil container and Oil.

1. Unplug unit from A. C. outlet.
2. Remove 2 bolts in front securing top. Lift top. Remove hoses attached to pump.
3. Insert thin hose into Vacuum port on compressor, other end should be connected to alternate pump.
4. Turn on pump and vacuum out oil into container.
5. Once completed remove thin hose, Reconnect hose to port.
6. Remove other end of hose from block and insert into new 10 oz. of Oil.
7. Plug unit into A.C. outlet and turn on. Program 5 minutes of Vacuum and allow compressor to vacuum oil.
8. Connect hose to block removed in step 6 and in step 2.
9. Check for leaks. Lower and secure top.

OIL CHANGE COMPLETE

PROCEDURE TO DISASSEMBLE BLOCK ASSEMBLY

CAUTION: *ALWAYS WEAR GOGGLES AND RELEASE PRESSURE BEFORE REMOVING ANY COMPONENTS. TO RELIEVE PRESSURE IN SUCTION SEPARATOR BOWL, ENTER S. S. MODE BY PRESSING THE SWITCH BY THE S. S. BOWL.*

SOLENOID DESCRIPTION	PART NUMBER	QTY.	DESCRIPTION	PART NUMBER	QTY.
Normally Closed	0304-0905-01	9	O-Ring (Small, S7)	0617-0211-01	1
Normally Open through (S7)	0304-0905-02	1	O-Ring (Med.)	0617-0211-02	9
Normally Open (Liquid, S11)	0304-0905-03	1	O-Ring (Large)	0617-0211-03	-
			O-Ring (Extra Large)	0617-0211-04	14

In order to service one of the sandwiched solenoids you will have to disassemble the block.

NOTE: *S7 solenoid connects both blocks. There will be an o-ring between the top of S7 and the front block. Front block will detach.*

1. Remove four countersunk screws, carefully move block assembly forward so it can be supported.
2. Disassemble solenoid found defective in self diagnostics. Simply remove the top nut and housing/coil assembly.
3. Then remove the shaft assembly with a flat blade screw driver from the brass solenoid body.
4. Remove the plunger guide from shaft assembly.
5. Clean solenoid body and replace O-ring; check plunger guide
6. Once all parts have been cleaned, lubricated, or changed reassemble solenoid.
7. Reinstall solenoid back in block.
8. Reassemble block making sure O-ring from S7 is in place (a little oil might help).

PROCEDURE COMPLETE

CHAPTER 4
PARTS

PARTS BY PICTORIAL

This chapter describes assemblies/subassemblies/parts considered replaceable at on-site field installation.

NOTE: The following is a breakdown description for Serial Numbers:

Serial Number Location - Rear Cabinet top right hand side.

Example: 0192A0101

01 Month MFG.
92 Year MFG.
A Serial Rev.
0101 Number of Units Built.

NOTES: *MRC-400/450 WITH A DATE CODE OF XX**92** AND EARLY XX**93** MAY HAVE THE LETTERS A, B, OR C. THESE ARE SERIAL A UNITS. PLEASE CONFIRM BY CHECKING SOFTWARE LEVEL, SEE BELOW .*

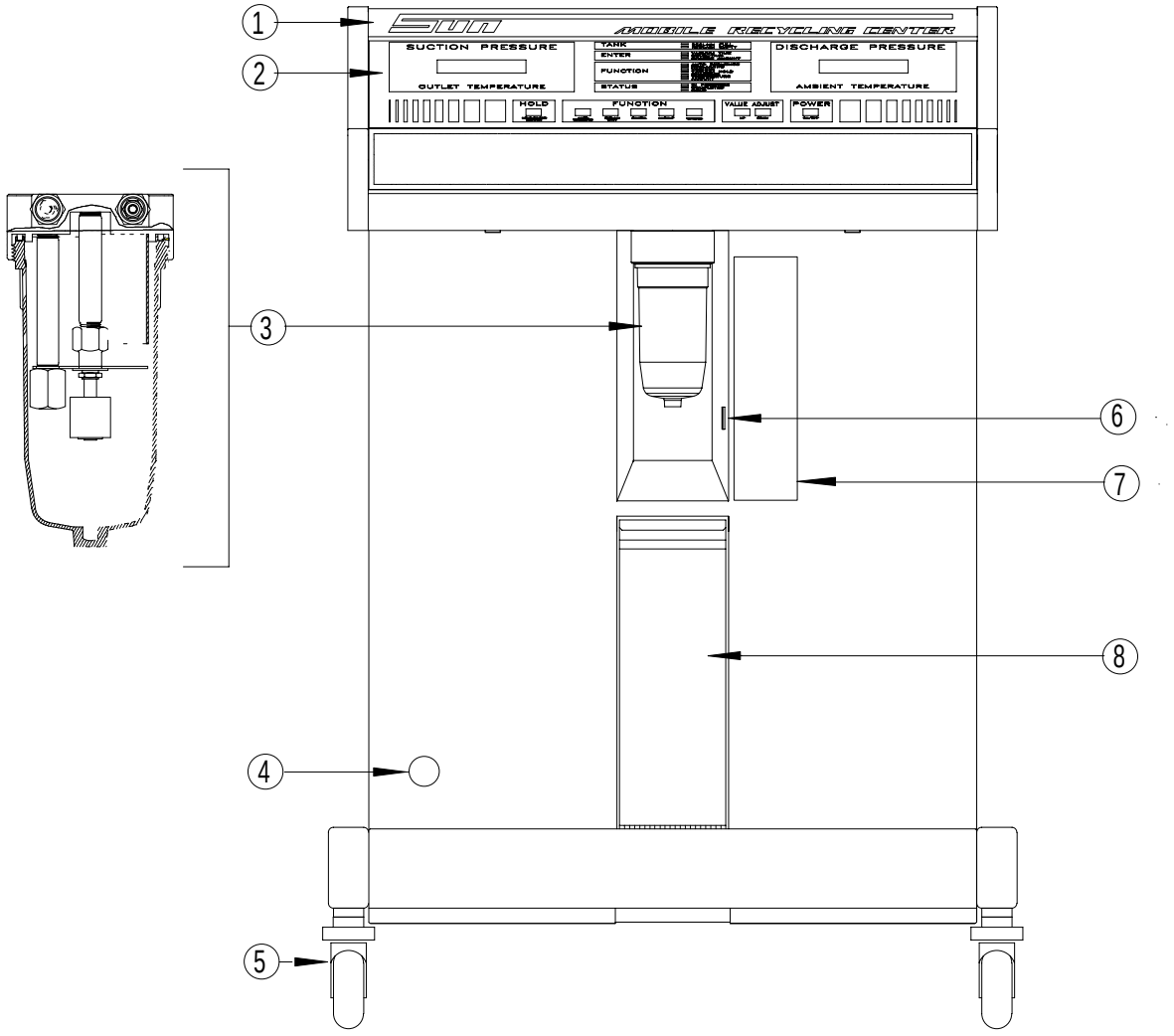
SERIAL A SOFTWARE STARTS WITH 1. XX ON POWER UP.

KEY **NS** = Not Shown

***** = Ford

\# = Crysler

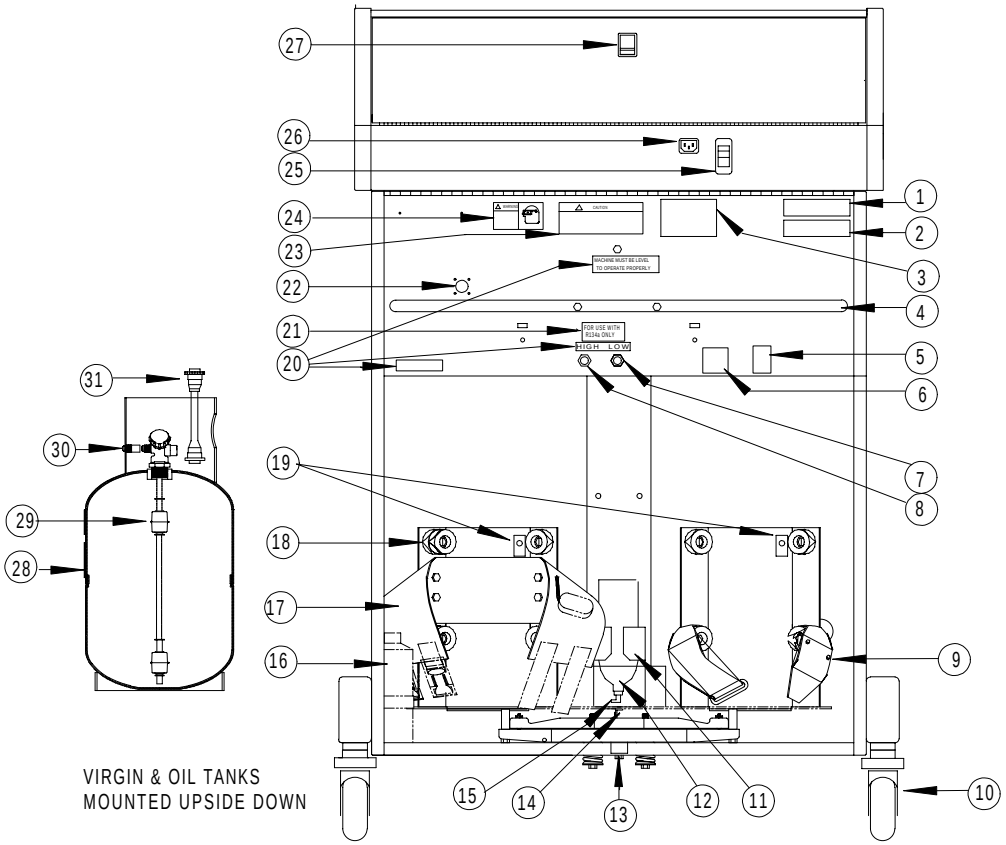
FRONT VIEW



ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1a.	Headsign, Sun Decal	0682-0964-01	6.	Switch, Service	0764-0254-01
1b.	FOR GENERIC P/N's	SEE PAGE 4-15	7.	Label, Service	0682-0969-01
2.	Control Panel, Assy.	See Page 4-5	8a.	Master Filter Kit R12	1095-0178-04
3.	Suction Separator Bowl	See Page 4-9	8b.	Master Filter Kit (R134a)¼"	1095-0178-02
4.	Moisture Indicator	7009-2346-01	N.S.	Desiccant Bags (Qty. 10)	0671-1018-02
5a.	Caster, W / Brake (Shaft)	3645-0054-02	N.S.	Master Filter Drier	7009-2099-01
5b.	Caster, W / Brake (Bolt)	3645-0056-02	N.S.	Gasket	4053-0020-01

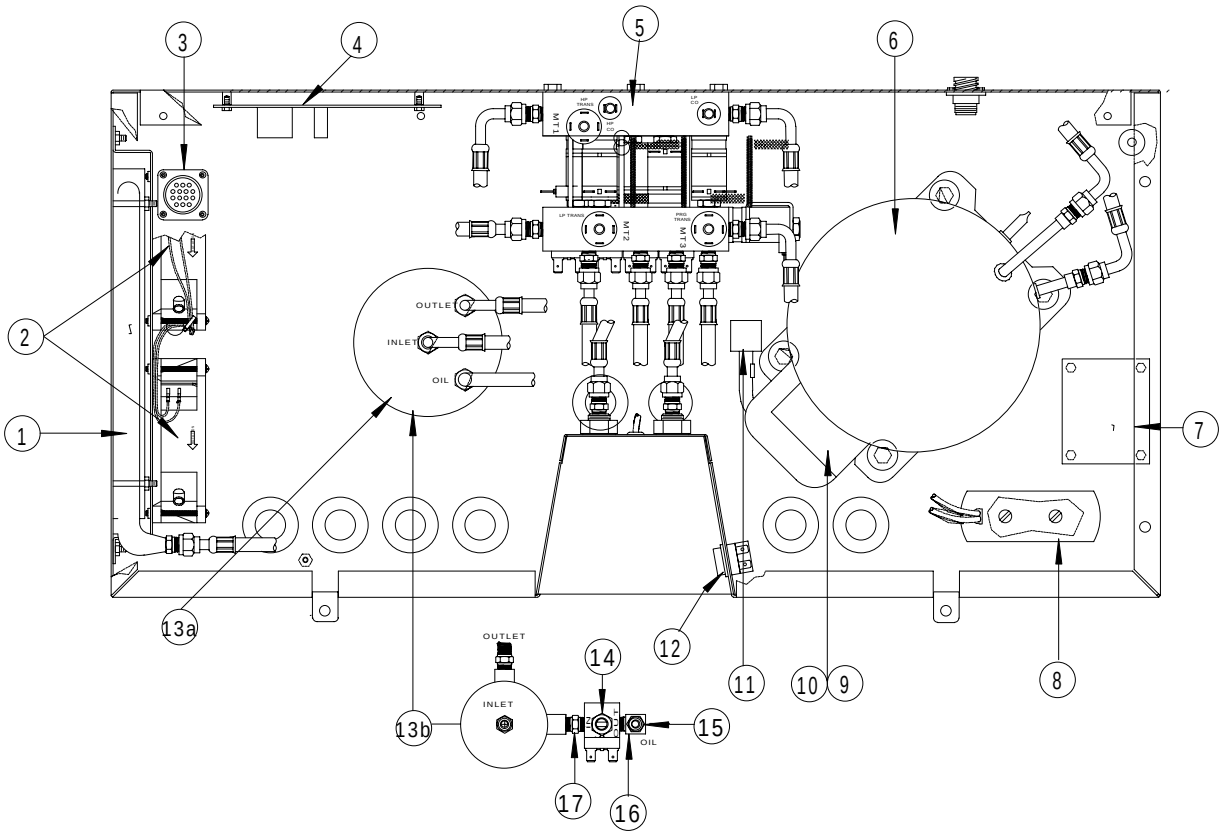
NOTE: * = Included in Master Filter Kit
NOTE: Casters for Sun version use shaft type. Casters for Snap-On version use bolt type.

REAR VIEW



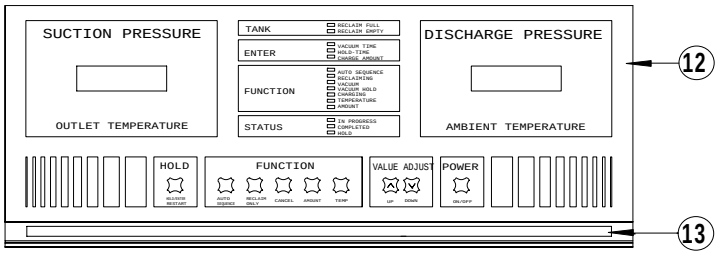
ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1.	Label, "Caution Vent"	0682-1038-01	15.	90 Degree Fitting	0647-0198-01
2.	Label, "French Use of"	0682-1039-01	16.	Plastic Bottle	0382-0510-01
3.	Label, "Caution Use of"	0682-0873-01	17a.	Heater Blanket 110VAC	0518-0024-01
4.	Bracket	7012-1369-01	17b.	Heater Blanket 220VAC	0518-0024-02
5.	Label,"Service Procedure"	0682-0969-01	18.	Bumpers	1489-0017-01
6.	Label, "Warning"	0682-0968-01	19.	Tank Switches (2)	0799-0237-01
7.	Bulkhead fittings R12	0647-0285-01	20.	Label, Info Guide	0682-0970-01
8.	Bulkhead fittings R134a	0647-0286-01	21.*	Label, R134a ONLY	0682-0760-01
9a.	Strap Right (30 lb.)	0424-0806-01	22.*	CPC 4 Pin Connector	4162-0831-01
9b.	Strap Right (50 lb.)	0424-0806-02	23.	Label, Caution	0682-1052-01
9c.	Strap Left	0424-0805-02	24.	Label, Eye Warning	0682-1051-01
10a.	Caster, W/O Brake (Shaft)	3645-0054-01	25.	On/Off/Circuit Breaker	1922-0118-01
10b.	Caster, W/O Brake (Bolt)	3645-0056-01	26.	A.C. Socket	4162-7015-01
11a.	Bracket, Oil	7012-1468-01	27.	Latch	5666-0049-01
11b.	Thumb screw	0675-0157	28a.	R12 Reclm. tk. 30 lb.	7009-2331-01
12a.	Cyl. Disposable Oil	0271-0071-01	28b.	R12 Reclm. tk. 50 lb.	7009-2331-02
12b.	Cyl. FORD Oil	0271-0072-01	28c.	R134a Reclm. tk. 30 lb.	7009-2331-03
12c.	Cyl. R134a Polyol Ester Oil	EAK0163L00A	28d.	R134a Reclm. tk. 50 lb.	7009-2331-04
13a.	Load Cell	7009-2335-01	29.	Switch Double Float	0764-0253-01
13b.	Scale Assembly 400	7009-2324-01	30a.	R12 Inline Filter 1/4"	7009-2417-01
13c.	Scale Assembly 450	7009-2324-02	30b.	R134a Inline Filter 1/2"	7009-2418-01
13d.	Scale Assy.400 (220VAC)	7009-2324-03	31.	Tank Float Cable	6004-0760-01
13e.	Scale Assy. 450 (220v)	7009-2324-04	**N.S.**	A.C. Cord	6001-0197-01
13f	Shock Mount Assy.	7009-2306-01	**N.S.**	Temp. Probe (Vehicle)	6004-0777-01
14.	Oil switch	2207-0034-01			

TOP VIEW OF PUMP COMPARTMENT

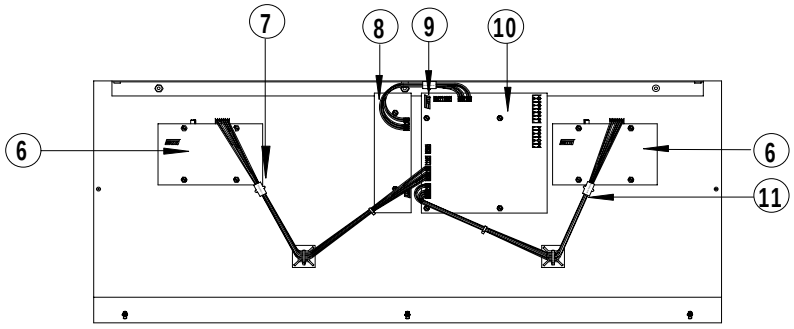


ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1.	Condenser	0111-0703-01	10a.	Relay (On Pump 110v)	0303-0109-07
2a.	Fan, Axial (115v)	0587-0504-01	10b.	Relay (On Pump 220v)	0303-0109-06
2b.	Fan, Axial (220v)	0587-0507-01	11a.	Cap (Pump Relay 110v)	7009-2348-01
3.	Connector, 14 Pin	4162-0832-01	11b.	Cap (Pump Relay 220v)	7009-2348-02
4.	Plumbing Board	7001-2185-01	11c.	Resister	0684-0686-01
5.	Manifold Block	See Page 4-6	12.	Switch (Momentary)	0764-0254-01
6a.	Compressor (110)	7009-2258-02	13a.	Oil Reservoir, Temprite	7009-2100-02
6b.	Compressor (220)	7009-2258-04	13b.	Oil Separator, Small	0111-0906-01
NS.	Compressor Oil 3GS/300 viscosity (24oz.)	0681-0179-02	14.	Solenoid, Separator	0304-0057-01
7.	Relay Board	7001-2230-01	15.	1/4” Flare fitting (Ser. A)	0647-0223-01
8a.	Capacitor, Start (110v)	0303-0109-09	16.	Elbow, 90º	0647-0044
8b.	Capacitor, Start (220v)	0303-0111-04	17.	Nipple, Hex	4982-0076-01
9.	Klixon, Overload protector	0303-0109-08			

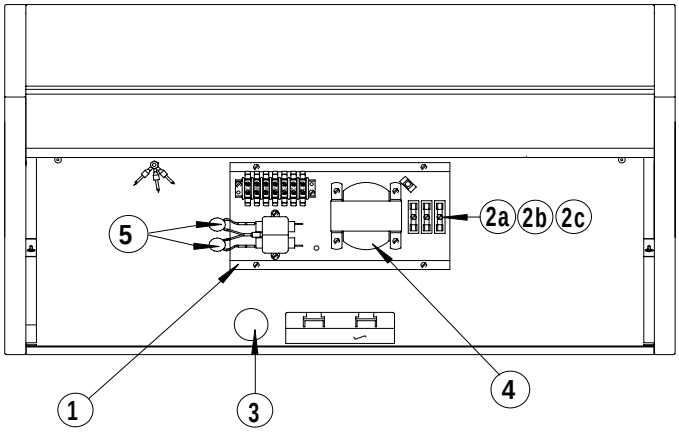
TOP OF HEADFRAME



MRC/MTC CONTROL PANEL



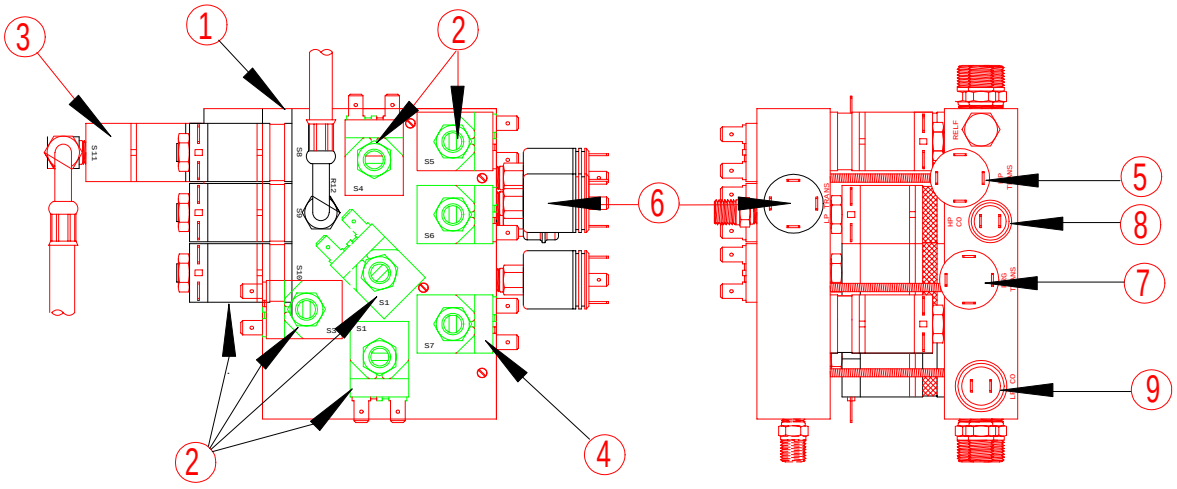
UNDER CONTROL PANEL



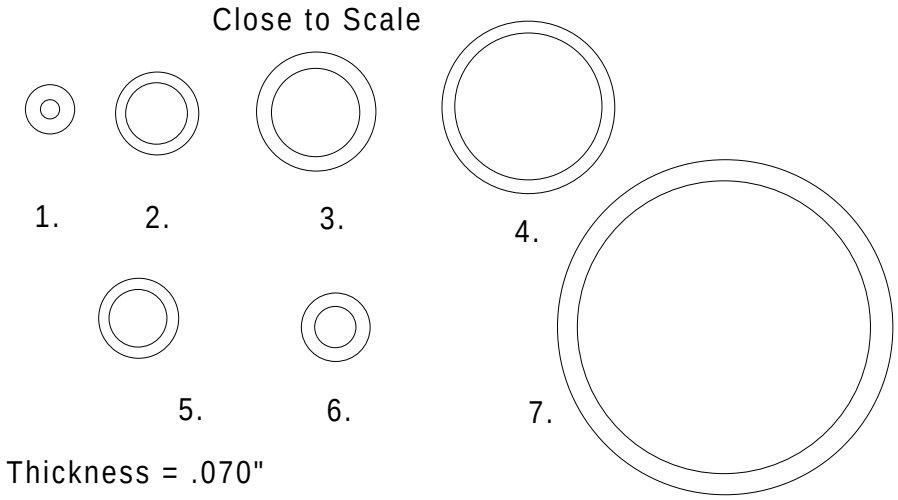
TOP VIEW

ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1a.	Power Supply (110V.A.C.)	7009-2323-01	6.	LCD Driver Bd.	7001-2153-01
1b.	Power Supply (220V.A.C.)	7009-2323-03	7.	W. H. (Rt. Display)	7076-0897-01
1c.	Power Supply (100V.A.C.)	7009-2323-02	8.	Led Driver Bd.	7001-2159-01
2a.	Fuse F1 (.25 amp)	0739-0119-01	9.	W.H. (Led Display)	7076-0896-01
2b.	Fuse F2 (1 amp)	0739-0040	10.	Processor Board.	7001-2188-01
2c.	Fuse F3 (3 amp)	0739-0103	11.	W.H. (Left Display)	7076-0897-02
3.	Alarm	0316-0205-01	12a.	Control Panel MRC400A	7005-2475-01
4.	Transformer	7009-2333-01	12b.	Control Panel Generic For labels see page 4-15	7005-2499-01
5a.	Varistor (115 V)	7009-1320	13a.	MRC-400, label	0682-1055-01
5b.	Varistor (220 V)	7009-1320-02	13b.	MRC-450, label	0682-1067-01
			NS.	A.C. Cord	6001-0197-01

MANIFOLD BLOCK ASSEMBLY

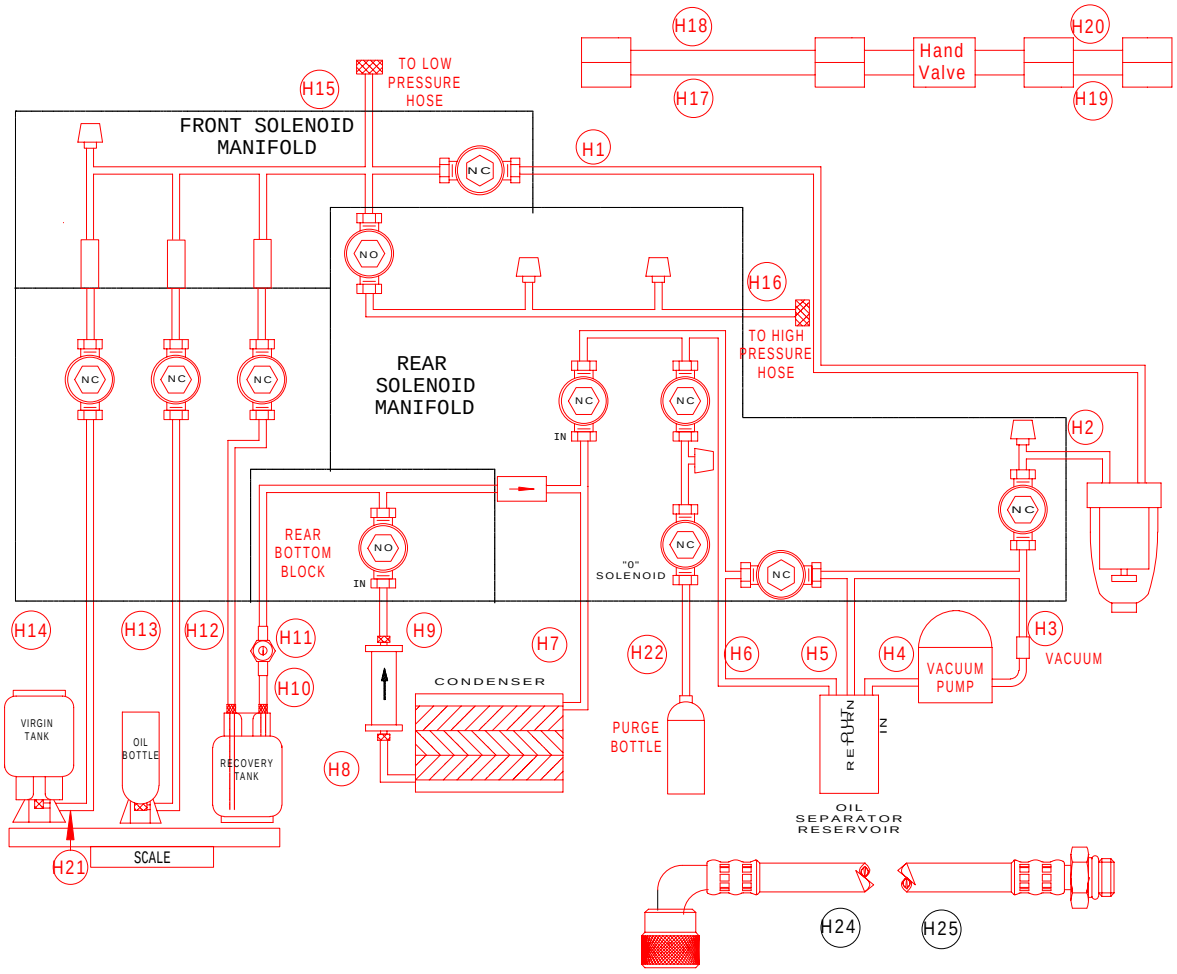


ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1.	Manifold Assembly	7009-2347-04	6.	Transducer Low Pres.	0514-0029-01
2.	Solenoid N.C.	0304-0905-01	7.	Transducer Purge Pres.	0514-0030-01
3.	Solenoid N.O.(S11 Liquid)	0304-0905-02	8.	Switch, High Pressure	0549-0036-01
4.	Solenoid N.O.(S7 X-Over)	0304-0905-03	9.	Switch, Low Pressure	0549-0035-01
5.	Transducer, High Pressure	0514-0030-01	**NS**.	Check Valve	1-4481



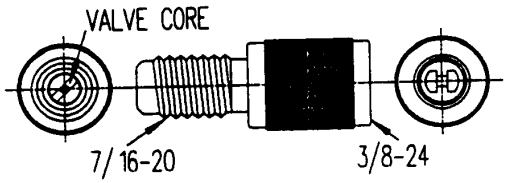
ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1.	O-Ring (Tiny S7) (od 7/32)	0617-0211-01	6.	O-Ring (Liq. Sol.) (od .309)	0617-0211-06
2.	O-Ring (Small) (od ½)	0617-0211-02	7.	O-Ring 2 oz. oil cyl.(od .1.5)	0617-0219-01
3.	O-Ring (Medium) (od 11/16)	0617-0211-03	8.	O-Ring Block Kit (Qty 37)	0617-0211-05
4.	O-Ring (Large) (od 15/16)	0617-0211-04	**NS**	Screw, Phillips	0406-0148-01
5.	O-Ring Inline valve (od 3/8)	0617-0212-01	**NS**	Permabond	0626-0575-01
			NS	Super Lube, 3 oz.	0681-0193-03

HOSE PART NUMBERS

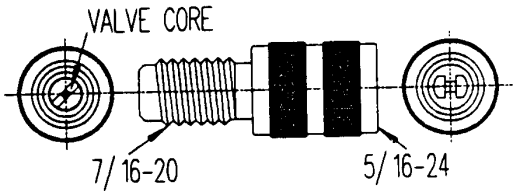


ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
H1.	Red 16"	3988-0265-01	H16.	Red 16"	3988-0265-01
H2.	Red 10"	3988-0265-02	H17.	Blue 96"	3988-0243-01
H3.	Red 18"	3988-0272-01	**NS.**	Blue Multi. (W/90º) 96"	3988-0292-01
H4.	Red 24"	3988-0272-02	H18.	Red 96"	3988-0244-01
H5.	Yel. 18"	3988-0270-01	**NS.**	Red Multi. (W/90º) 96"	3988-0293-01
H6.	Red 18"	3988-0272-01	H19.	Hand Valve w/Blue 10"	3988-0234-02
H7.	Red 16"	3988-0265-01	H20.	Hand Valve w/Red 10"	3988-0233-02
H8.	Blue 21"	3988-0267-01	H21.	R134a (6") adapter	3988-0277-01
H9.	Blue 33"	3988-0267-02	H22.	Vent tube to bottle	0669-0282-01
H10.	Red 27"	3988-0268-01	H23.	Hand Valve	5121-0004-01
H11.	Blue 38"	3988-0254-02	H24.	R134a Red 96” (W90º)	EAH0001C01A
H12.	Blue 37"	3988-0271-01	H25.	R134a Blue 96” (W90º)	EAH0001C02A
H13.	Yel. 33"	3988-0273-01	**NS**.	Crush Washer, Copper	0647-0296-01
H14.	Blue 45"	3988-0271-02	**NS**.	Anti-Blow Back Val. ¼"	4719-0055-01
H15.	Blue 18"	3988-0301-01	**NS**.	Anti-Blow Back Val. ½"	4719-0055-02

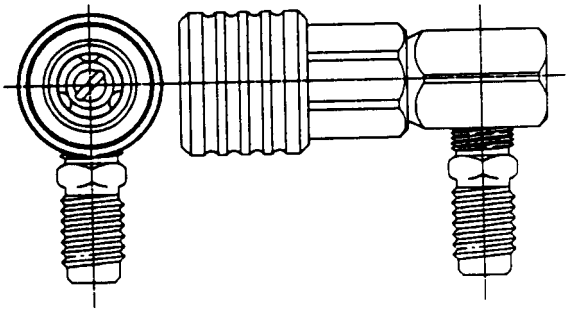
ADAPTERS / FITTINGS



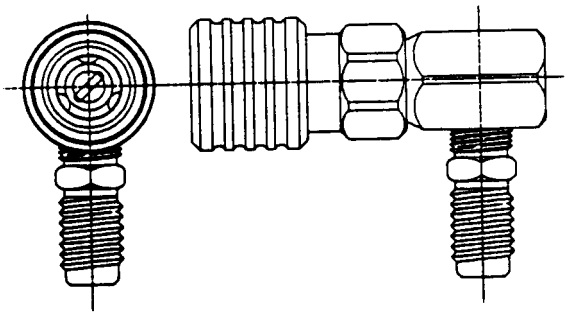
GM ADAPTER
0647-0196-01



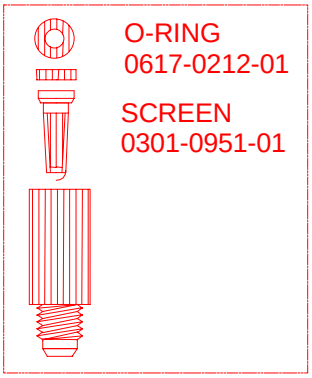
FORD ADAPTER
0647-0200-01



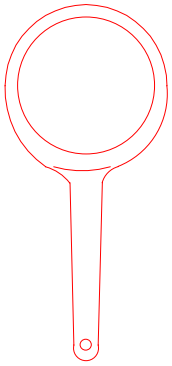
LARGE GM ADAPTER QUICK DISCONNECT
0647-0199-01



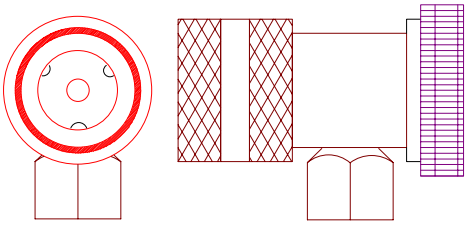
GM/FORD ADAPTER QUICK DISCONNECT
0647-0197-01



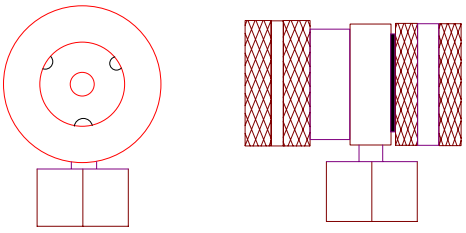
INLINE FILTER
7009-2417-01 (R-12)
7009-2418-01 (R134a)



FILTER WRENCH
0001-0067-01

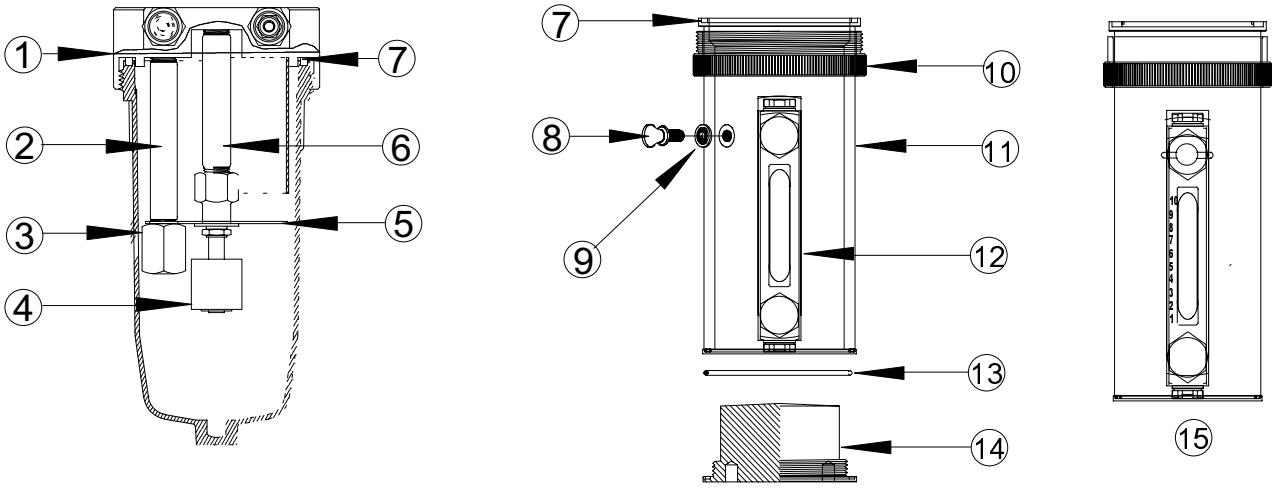


HIGH 0647-0287-07
LOW 0647-0287-08
O-Ring Kit EAK0027C00AS



HIGH 0647-0287-09
LOW 0647-0287-10
ARG 04040 (10 each)

SUCTION SEPARATOR



ITEM	DESCRIPTION	EQUI SERV #
1.	Cap and shield	7020-1982-01
2.	Fitting, nipple	4982-0074-01
3.	Atomizer Fitting	7024-0511-01
4a.	Float Switch Assembly	7009-2102-01
4b.	Float	0546-0017-01
5.	Plate	4982-0076-01
6.	Fitting, nipple	4982-0073-01
7.	Gasket, Bowl	4053-0020-01
8.	Thumbscrew	0938-0158-01
9.	Washer	0400-5605-01
10.	Ring, Mounting Bowl	0382-0512-01
11.	Bowl, Suction Separator (Aluminum)	0382-0513-01
12.	Gauge, Liquid Level	0330-0010-01
13.	O-Ring, Bottom Cap	0617-0220-01
14.	Bowl, Bottom Cap	0382-0514-01
15.	Metal Bowl Kit (Solid bowl)	EAA0088C00A

PARTS IN ALPHABETICAL ORDER

NAME	PART NUMBER	400	450	COMMENTS
Adapter, Ford	0647-0200-01	X		
Adapter, GM	0647-0196-01	X		
Adapter, GM,	0647-0199-01	X		Large, QK. Dis., 90º
Adapter, GM/Ford	0647-0197-01	X		
Adapter, R134a	0647-0287-07		X	
Adapter, R134a	0647-0287-08		X	
Alarm	0316-0205-01	X	X	
Board, LCD Driver	7001-2153-01	X	X	
Board, Led Driver	7001-2159-01	X	X	
Board, Plumbing	7001-2185-01	X	X	
Board, Processor	7001-2188-01	X	X	
Board, Relay	7001-2230-01	X	X	
Bottle, Plastic	0382-0510-01	X	X	
Bowl	0382-0009-02	X	X	
Bowl, Separator	0382-0513-01	X	X	Metal bowl
Bowl, Bottom Cap	0382-0514-01	X	X	Metal bowl
Bowl, Metal Kit	EAK0071C00AS			
Bowl, Metal (Solid)	EAA0088C00A	X	X	Solid Metal bowl
Bracket, Oil	7012-1468-01	X		
Bracket, Rear hose	7012-1369-01	X	X	
Breaker, On/Off/Circuit	1922-0118-01	X	X	
Bulkhead fittings R12	0647-0285-01	X		
Bulkhead fittings R134a	0647-0286-01		X	
Bumpers	1489-0017-01	X	X	
Cable, Tank Float	6004-0760-01	X	X	
Cap and Shield	7020-1982-01	X	X	Top of S. S. bowl
Capacitor	7009-2348-01	X	X	(Pump Relay 110v)
Capacitor	7009-2348-02	X		(Pump Relay 220v)
Capacitor, Start	0303-0109-09	X	X	(110v)
Capacitor, Start	0303-0111-04	X	X	(220v)
Caster, W / Brake	3645-0054-02	X	X	
Caster, W / O Brake	3645-0054-01	X	X	
Caster, W / Brake	3645-0056-02	X	X	
Caster, W / O Brake	3645-0056-01	X	X	
Compressor	7009-2258-02	X	X	110 VAC
Compressor	7009-2258-04	X	X	220 VAC
Compressor Oil	0681-0179-02	X	X	3GS/300 viscosity (24oz.)
Condenser	0111-0703-01	X	X	
Connector, 14 Pin	4162-0832-01	X	X	
Connector, CPC 4 Pin	4162-0831-01	X	X	
Control Panel	7005-2499-01	X	X	Generic
Control Panel	7005-2475-01	X		MRC-400A
Cord, A.C.	6001-0197-01	X	X	
Crush Washer,	0647-0296-01	X	X	Copper
Cylinder, Disposable Oil	0271-0071-01	X		Naphtheric, minerial oil
Cylinder, Disposable Oil	0271-0072-01	X		Ford, Paraffinic mineral oil
Cylinder, R134a Oil	EAK0163L00A		X	Ester oil in a Disposable cylinder
Desiccant Bags	0671-1018-01	X		(Qty. 10)
Desiccant Bags	0671-1018-02		X	(Qty. 10)
Elbow, 90º	0647-0044	X	X	
Fan, Axial	0587-0504-01	X	X	(115v)
Fan, Axial	0587-0507-01	X	X	(220v)
Filter, Inline 1/2"	7009-2418-01		X	R134a
Filter, Inline 1/4"	7009-2417-01	X		R12
Fitting	0647-0198-01	X	X	90 Degree

NAME	PART NUMBER	400	450	COMMENTS
Fitting	0647-0223-01	X	X	1/4” Flare
Fitting, Atomizer	7024-0511-01	X	X	
Fitting, nipple	4982-0074-01	X	X	S.S. Bowl
Float Switch Assembly	7009-2102-01	X	X	
Float	0546-0017-01	X	X	
Fuse, F1	0739-0119-01	X	X	(.25 amp)
Fuse, F2	0739-0040	X	X	(1 amp)
Fuse, F3	0739-0103	X	X	(3 amp)
Gasket	4053-0020-01	X	X	Suction Separator Bowl
Gauge, Liquid level	0330-0010-01	X	X	Metal bowl
Headsign, Sun Decal	0682-0964-01	X	X	
Heater Blanket	0518-0024-02	X	X	220VAC
Heater Blanket	0518-0024-01	X	X	110VAC
Hose, Blue 10"	3988-0234-02	X		
Hose, Blue 18"	3988-0271-02	X	X	
Hose, Blue 21"	3988-0267-01	X	X	
Hose, Blue 33"	3988-0267-02	X	X	
Hose, Blue 37"	3988-0271-01	X	X	
Hose, Blue 38"	3988-0254-02	X	X	
Hose, Blue 45"	3988-0271-02	X	X	
Hose, Blue 96"	3988-0243-01	X		
Hose, Blue Multi.	3988-0292-01	X		96" (W/90º)
Hose, R134a	3988-0277-01		X	(6") adapter
Hose, R134a Blue	EAH0001C02A		X	96” (W90º)
Hose, Red 10"	3988-0265-02	X	X	
Hose, Red 10"	3988-0233-02	X		
Hose, Red 16"	3988-0265-01	X	X	
Hose, Red 16"	3988-0265-01	X	X	
Hose, Red 16"	3988-0265-01	X	X	
Hose, Red 18"	3988-0272-01	X	X	
Hose, Red 18"	3988-0272-01	X	X	
Hose, Red 24"	3988-0272-02	X	X	
Hose, Red 27"	3988-0268-01	X	X	
Hose, Red 96"	3988-0244-01	X		
Hose, Red Multi.	3988-0293-01	X		96" (W/90º)
Hose, Red,	EAH0001C01A		X	96” (W90º) R134a
Hose, Yel. 18"	3988-0270-01	X	X	
Hose, Yel. 33"	3988-0273-01	X	X	
Inlet Tube	4982-0074-01	X	X	
Kit, Master Filter	1095-0178-04	X		R-12 (1/4” Fittings)
Kit, Master Filter	1095-0178-02		X	R-134a Serial A (1/4" Fittings)
Kit, Master Filter	1095-0178-03		X	R-134a Serial B (1/2" Fittings)
Label	0682-1038-01	X	X	"Caution Vent"
Label	0682-0873-01	X	X	"Caution Use of"
Label	0682-0968-01	X	X	"Warning"
Label	0682-1052-01	X	X	Caution
Label	0682-1051-01	X	X	Eye Warning
Label	0682-1055-01	X		Front panel MRC-400 label
Label	0682-1067-01		X	Front panel MRC-450 label
Label	0682-0970-01	X	X	Info Guide
Label	0682-0760-01		X	R134a ONLY
Label	0682-0969-01	X	X	"Service Procedure"
Label	0682-1039-01	X	X	"French Use of
Latch	5666-0049-01	X	X	Rear Glove Box
Load Cell	7009-2335-01	X	X	
Manifold Assembly	7009-2347-04	X	X	
Master Filter Drier	7009-2426-01		X	R-134a, 1/2” fitting
Master Filter Drier	7009-2099-01	X		R-12, 1/4” fitting

NAME	PART NUMBER	400	450	COMMENTS
Moisture Indicator	7009-2346-01	X	X	
Nipple, Hex	4982-0076-01	X	X	
O-Ring	0617-0211-06	X	X	(Liq. Sol.) (od .309)
O-Ring Block Kit	0617-0211-05	X	X	(Qty 37, for pneumatic block)
O-Ring	0617-0211-04	X	X	(Large)
O-Ring	0617-0211-03	X	X	(Medium)
O-Ring	0617-0211-02	X	X	(Small)
O-Ring (Small)	0617-0211-01	X	X	(Small)
O-Ring	0617-0212-01	X	X	Inline hand valve
O-Ring	0617-0219-01	X	X	2 ounce oil charge cylinder
O-Ring, bottom of bowl	0617-0220-01	X	X	Metal bowl
Oil Reservoir, Temprite	7009-2100-02	X	X	
Oil Separator, Small	0111-0906-01	X	X	
Permabond	0626-0575-01	X	X	
Power Supply	7009-2323-02	X	X	(100V.A.C.)
Power Supply	7009-2323-01	X	X	(110V.A.C.)
Power Supply	7009-2323-03	X	X	(220V.A.C.)
Relay	0303-0109-07	X	X	(On Pump 110v)
Relay	0303-0109-06	X	X	(On Pump 220v)
Resister	0684-0686-01	X	X	
Scale Assembly	7009-2324-01	X	X	
Scale Assembly	7009-2324-03	X	X	(220VAC)
Scale Assembly	7009-2324-02	X	X	
Scale Assembly	7009-2324-04	X	X	(220VAC)
Screw, Phillips	0406-0148-01	X	X	In Block. (Qty. = 4)
Screw, Thumb	0675-0157	X		For Oil Bracket
Shock Mount Assy.	7009-2306-01			X-brace for scale
Socket, A.C.	4162-7015-01	X	X	
Solenoid N.C.	0304-0905-01	X	X	Most solenoids.
Solenoid N.O.(S11)	0304-0905-02	X	X	Liquid
Solenoid N.O.S7	0304-0905-03	X	X	X-Over
Solenoid, Separator	0304-0057-01	X	X	Small oil separator
Strap, Velcro	0424-0805-02	X	X	Left
Strap, Velcro Right	0424-0806-01	X	X	(30 lb.)
Strap, Velcro Right	0424-0806-02	X	X	(50 lb.)
Suction Separator Assy.	7009-2185-01	X	X	
Super Lube,	0681-0193-03	X	X	3 oz.
Switch Float	7009-2102-01	X	X	
Switch Oil	2207-0034-01	X	X	
Switch, (Momentary)	0764-0254-01	X	X	
Switch, Double Float	0764-0253-01	X	X	
Switch, High Pressure	0549-0036-01	X	X	
Switch, Low Pressure	0549-0035-01	X	X	
Switch, Service	0764-0254-01	X	X	
Switch, Tank (2)	0799-0237-01	X	X	
Tank, R12 Recovery	7009-2331-01	X		30 lb.
Tank, R12 Recovery	7009-2331-02	X		50 lb.
Tank, R134a Recovery	7009-2331-03		X	30 lb.
Tank, R134a Recovery	7009-2331-04		X	50 lb.
Temp. Probe	6004-0777-01	X	X	(Vehicle)
Thumbscrew	0938-0158-01	X	X	Metal bowl
Transducer, High Pres.	0514-0030-01	X	X	
Transducer, Low Pres.	0514-0029-01	X	X	
Transducer, Purge Pres.	0514-0030-01	X	X	
Transformer	7009-2333-01	X	X	
Valve, Anti-Blow Back	4719-0055-02		X	1/2", (R134a)
Valve, Anti-Blow Back	4719-0055-01	X		1/4", (R-12)
Valve, Hand	5121-0004-01	X	X	

NAME	PART NUMBER	400	450	COMMENTS
Varistor	7009-1320	X	X	(115 V)
Varistor	7009-1320-02	X	X	(220 V)
Vent tube to bottle	0669-0282-01	X	X	
Washer	0400-5605-01	X	X	Metal bowl

PARTS IN NUMERICAL ORDER

NAME	PART NUMBER	400	450	COMMENTS
Condenser	0111-0703-01	X	X	
Oil Separator, Small	0111-0906-01	X	X	
Cylinder, Disposable Oil	0271-0071-01	X		Naphtheric, minerial oil
Cylinder, Disposable Oil	0271-0072-01	X		Ford, Paraffinic mineral oil
Relay	0303-0109-06	X	X	(On Pump 220v)
Relay	0303-0109-07	X	X	(On Pump 110v)
Capacitor, Start	0303-0109-09	X	X	(110v)
Capacitor, Start	0303-0111-04	X	X	(220v)
Solenoid, Separator	0304-0057-01	X	X	Small oil separator
Solenoid N.C.	0304-0905-01	X	X	Most solenoids.
Solenoid N.O.(S11)	0304-0905-02	X	X	Liquid
Solenoid N.O.S7	0304-0905-03	X	X	X-Over
Alarm	0316-0205-01	X	X	
Gauge, Liquid level	0330-0010-01	X	X	Metal bowl
Bowl	0382-0009-02	X	X	
Bottle, Plastic	0382-0510-01	X	X	
Bowl, Separator	0382-0513-01	X	X	Metal bowl
Bowl, Bottom Cap	0382-0514-01	X	X	Metal bowl
Washer	0400-5605-01	X	X	Metal bowl
Screw, Phillips	0406-0148-01	X	X	In Block. (Qty. = 4)
Strap, Velcro	0424-0805-02	X	X	Left
Strap, Velcro Right	0424-0806-01	X	X	(30 lb.)
Strap, Velcro Right	0424-0806-02	X	X	(50 lb.)
Transducer, Low Pres.	0514-0029-01	X	X	
Transducer, High Pres.	0514-0030-01	X	X	
Transducer, Purge Pres.	0514-0030-01	X	X	
Heater Blanket	0518-0024-01	X	X	110VAC
Heater Blanket	0518-0024-02	X	X	220VAC
Float	0546-0017-01	X	X	
Switch, Low Pressure	0549-0035-01	X	X	
Switch, High Pressure	0549-0036-01	X	X	
Fan, Axial	0587-0504-01	X	X	(115v)
Fan, Axial	0587-0507-01	X	X	(220v)
O-Ring (Small)	0617-0211-01	X	X	(Small)
O-Ring	0617-0211-02	X	X	(Small)
O-Ring	0617-0211-03	X	X	(Medium)
O-Ring	0617-0211-04	X	X	(Large)
O-Ring Block Kit	0617-0211-05	X	X	(Qty 37, for pneumatic block)
O-Ring	0617-0211-06	X	X	(Liq. Sol.) (od .309)
O-Ring	0617-0212-01	X	X	Inline hand valve
O-Ring	0617-0219-01	X	X	2 ounce oil charge cylinder
O-Ring, bottom of bowl	0617-0220-01	X	X	Metal bowl
Permabond	0626-0575-01	X	X	
Elbow, 90º	0647-0044	X	X	
Adapter, GM	0647-0196-01	X		
Adapter, GM/Ford	0647-0197-01	X		
Fitting	0647-0198-01	X	X	90 Degree
Adapter, GM,	0647-0199-01	X		Large, QK. Dis., 90º
Adapter, Ford	0647-0200-01	X		
Fitting	0647-0223-01	X	X	1/4” Flare
Bulkhead fittings R12	0647-0285-01	X		
Bulkhead fittings R134a	0647-0286-01		X	
Adapter, R134a	0647-0287-07		X	
Adapter, R134a	0647-0287-08		X	
Crush Washer,	0647-0296-01	X	X	Copper
Vent tube to bottle	0669-0282-01	X	X	

NAME	PART NUMBER	400	450	COMMENTS
Desiccant Bags	0671-1018-01	X		(Qty. 10)
Desiccant Bags	0671-1018-02		X	(Qty. 10)
Screw, Thumb	0675-0157	X		For Oil Bracket
Compressor Oil	0681-0179-02	X	X	3GS/300 viscosity (24oz.)
Super Lube,	0681-0193-03	X	X	3 oz.
Label	0682-0760-01		X	R134a ONLY
Label	0682-0873-01	X	X	"Caution Use of"
Headsign, Sun Decal	0682-0964-01	X	X	
Label	0682-0968-01	X	X	"Warning"
Label	0682-0969-01	X	X	"Service Procedure"
Label	0682-0970-01	X	X	Info Guide
Label	0682-1038-01	X	X	"Caution Vent"
Label	0682-1039-01	X	X	"French Use of
Label	0682-1051-01	X	X	Eye Warning
Label	0682-1052-01	X	X	Caution
Label	0682-1055-01	X		Front panel MRC-400 label
Label	0682-1067-01		X	Front panel MRC-450 label
Resister	0684-0686-01	X	X	
Fuse, F2	0739-0040	X	X	(1 amp)
Fuse, F3	0739-0103	X	X	(3 amp)
Fuse, F1	0739-0119-01	X	X	(.25 amp)
Switch, Double Float	0764-0253-01	X	X	
Switch, (Momentary)	0764-0254-01	X	X	
Switch, Service	0764-0254-01	X	X	
Switch, Tank (2)	0799-0237-01	X	X	
Thumbscrew	0938-0158-01	X	X	Metal bowl
Kit, Master Filter	1095-0178-02		X	R-134a Serial A (1/4" Fittings)
Kit, Master Filter	1095-0178-03		X	R-134a Serial B (1/2" Fittings)
Kit, Master Filter	1095-0178-04	X		R-12 (1/4” Fittings)
Bumpers	1489-0017-01	X	X	
Breaker, On/Off/Circuit	1922-0118-01	X	X	
Switch Oil	2207-0034-01	X	X	
Caster, W / O Brake	3645-0054-01	X	X	
Caster, W / Brake	3645-0054-02	X	X	
Caster, W / O Brake	3645-0056-01	X	X	
Caster, W / Brake	3645-0056-02	X	X	
Hose, Red 10"	3988-0233-02	X		
Hose, Blue 10"	3988-0234-02	X		
Hose, Blue 96"	3988-0243-01	X		
Hose, Red 96"	3988-0244-01	X		
Hose, Blue 38"	3988-0254-02	X	X	
Hose, Red 16"	3988-0265-01	X	X	
Hose, Red 16"	3988-0265-01	X	X	
Hose, Red 16"	3988-0265-01	X	X	
Hose, Red 10"	3988-0265-02	X	X	
Hose, Blue 21"	3988-0267-01	X	X	
Hose, Blue 33"	3988-0267-02	X	X	
Hose, Red 27"	3988-0268-01	X	X	
Hose, Yel. 18"	3988-0270-01	X	X	
Hose, Blue 37"	3988-0271-01	X	X	
Hose, Blue 18"	3988-0271-02	X	X	
Hose, Blue 45"	3988-0271-02	X	X	
Hose, Red 18"	3988-0272-01	X	X	
Hose, Red 18"	3988-0272-01	X	X	
Hose, Red 24"	3988-0272-02	X	X	
Hose, Yel. 33"	3988-0273-01	X	X	
Hose, R134a	3988-0277-01		X	(6") adapter
Hose, Blue Multi.	3988-0292-01	X		96" (W/90º)
Hose, Red Multi.	3988-0293-01	X		96" (W/90º)

NAME	PART NUMBER	400	450	COMMENTS
Gasket	4053-0020-01	X	X	Suction Separator Bowl
Connector, CPC 4 Pin	4162-0831-01	X	X	
Connector, 14 Pin	4162-0832-01	X	X	
Socket, A.C.	4162-7015-01	X	X	
Valve, Anti-Blow Back	4719-0055-01	X		1/4", (R-12)
Valve, Anti-Blow Back	4719-0055-02		X	1/2", (R134a)
Fitting, nipple	4982-0074-01	X	X	S.S. Bowl
Inlet Tube	4982-0074-01	X	X	
Nipple, Hex	4982-0076-01	X	X	
Valve, Hand	5121-0004-01	X	X	
Latch	5666-0049-01	X	X	Rear Glove Box
Cord, A.C.	6001-0197-01	X	X	
Cable, Tank Float	6004-0760-01	X	X	
Temp. Probe	6004-0777-01	X	X	(Vehicle)
Board, LCD Driver	7001-2153-01	X	X	
Board, Led Driver	7001-2159-01	X	X	
Board, Plumbing	7001-2185-01	X	X	
Board, Processor	7001-2188-01	X	X	
Board, Relay	7001-2230-01	X	X	
Control Panel	7005-2475-01	X		MRC-400A
Control Panel	7005-2499-01	X	X	Generic
Varistor	7009-1320	X	X	(115 V)
Varistor	7009-1320-02	X	X	(220 V)
Master Filter Drier	7009-2099-01	X		R-12, 1/4” fitting
Oil Reservoir, Temprite	7009-2100-02	X	X	
Float Switch Assembly	7009-2102-01	X	X	
Switch Float	7009-2102-01	X	X	
Suction Separator Assy.	7009-2185-01	X	X	
Compressor	7009-2258-02	X	X	110 VAC
Compressor	7009-2258-04	X	X	220 VAC
Shock Mount Assy.	7009-2306-01			X-brace for scale
Power Supply	7009-2323-01	X	X	(110V.A.C.)
Power Supply	7009-2323-02	X	X	(100V.A.C.)
Power Supply	7009-2323-03	X	X	(220V.A.C.)
Scale Assembly	7009-2324-01	X	X	
Scale Assembly	7009-2324-02	X	X	
Scale Assembly	7009-2324-03	X	X	(220VAC)
Scale Assembly	7009-2324-04	X	X	(220VAC)
Tank, R12 Recovery	7009-2331-01	X		30 lb.
Tank, R12 Recovery	7009-2331-02	X		50 lb.
Tank, R134a Recovery	7009-2331-03		X	30 lb.
Tank, R134a Recovery	7009-2331-04		X	50 lb.
Transformer	7009-2333-01	X	X	
Load Cell	7009-2335-01	X	X	
Moisture Indicator	7009-2346-01	X	X	
Manifold Assembly	7009-2347-04	X	X	
Capacitor	7009-2348-01	X	X	(Pump Relay 110v)
Capacitor	7009-2348-02	X		(Pump Relay 220v)
Filter, Inline 1/4"	7009-2417-01	X		R12
Filter, Inline 1/2"	7009-2418-01		X	R134a
Master Filter Drier	7009-2426-01		X	R-134a, 1/2” fitting
Bracket, Rear hose	7012-1369-01	X	X	
Bracket, Oil	7012-1468-01	X		
Cap and Shield	7020-1982-01	X	X	Top of S. S. bowl
Hose, Red,	EAH0001C01A		X	96” (W90º) R134a
Hose, R134a Blue	EAH0001C02A		X	96” (W90º)
Bowl, Metal Kit	EAK0071C00AS			
Cylinder, R134a Oil	EAK0163L00A		X	Ester oil in a Disposable cylinder

GRAPHICS KITS P/N'S FOR GENERIC UNITS IN BRAND NAME ORDER:

NOTE: *1091 KITS ARE IN FINISHED GOODS STOCK.*

Kit #	HEADSIGN #	FRONT FACIA #	DESCRIPTION
1091-0280-03	0682-1074-01	0682-1075-01	ATLAS EAC-400
1091-0277-03	0682-1074-01	0682-1090-01	ATLAS EAC-450
1091-0261-04	0682-1023-01	NA	CAR QUEST MTC-4000
1091-0261-08	0682-1027-01	NA	CAR QUEST MTC-4500
1091-0261-02	0682-1021-01	NA	EVERCO MTC-4000
1091-0261-06	0682-1025-01	NA	EVERCO MTC-4500
1091-0261-03	0682-1022-01	NA	MURRAY MTC-4000
1091-0261-07	0682-1026-01	0682-1099-01	MURRAY MTC-4500
1091-0261-01	0682-1020-01	NA	NAPA MTC-4000
1091-0261-05	0682-1024-01	NA	NAPA MTC-4500
1091-0280-04	0682-1097-01	0682-1098-01	NAPA MTC-4000
1091-0277-04	0682-1097-01	0682-1099-01	NAPA MTC-4500
SPECIAL CONSIDERATIONS			
1091-0280-02	0682-0966-01	NA	ROTUNDA MTC-4000 "WARNING" LABEL 0682-1051-01 "CAUTION" LABEL 0682-1052-01
1091-0277-02	NA	0682-1053-01	ROTUNDA MTC-4500 "R134a ONLY"0682-1050-01 "WARNING"0682-1051-01 "DO NOT MIX" 0682-1052-01

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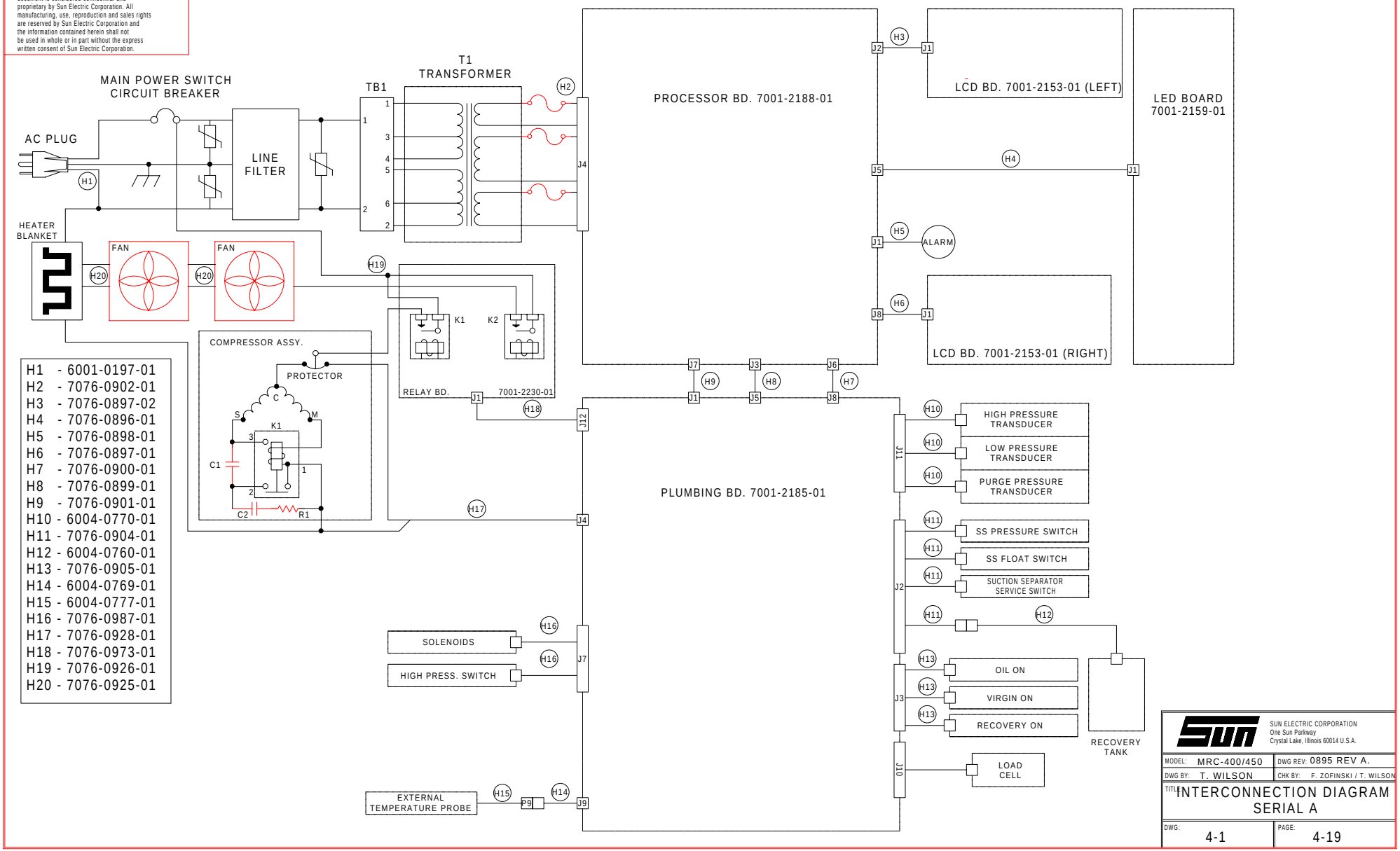


H1	6001-0197-01
H2	7076-0902-01
H3	7076-0897-02
H4	7076-0896-01
H5	7076-0898-01
H6	7076-0897-01
H7	7076-0900-01
H8	7076-0899-01
H9	7076-0901-01
H10	6004-0770-01
H11	7076-0904-01
H12	6004-0760-01
H13	7076-0905-01
H14	6004-0769-01
H15	6004-0777-01
H16	7076-0987-01
H17	7076-0928-01
H18	7076-0973-01
H19	7076-0926-01
H20	7076-0925-01

SUN ELECTRIC CORPORATION
One Sun Parkway
Crystal Lake, Illinois 60014 U.S.A.

MODEL: MRC-400/450	DWG REV: 0895 REV A.
DWG BY: T. WILSON	CHK BY: F. ZOFINSKI / T. WILSON

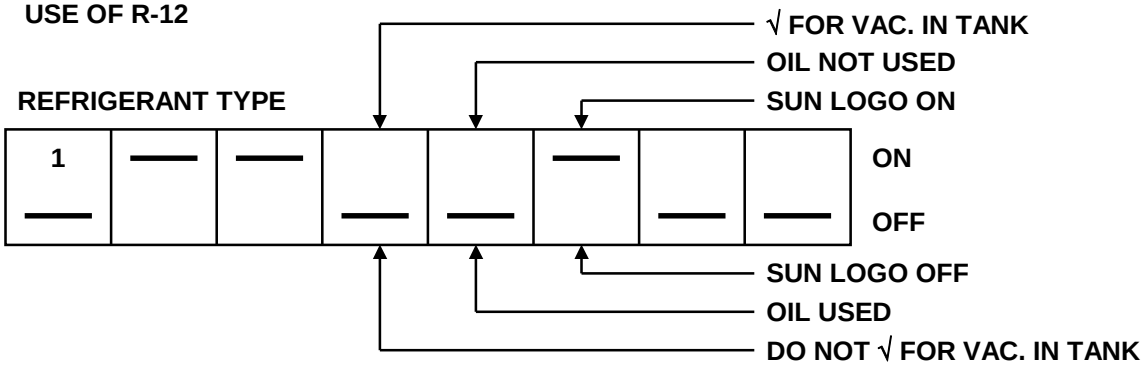
TITLE: INTERCONNECTION DIAGRAM SERIAL A

DWG: 4-1	PAGE: 4-19

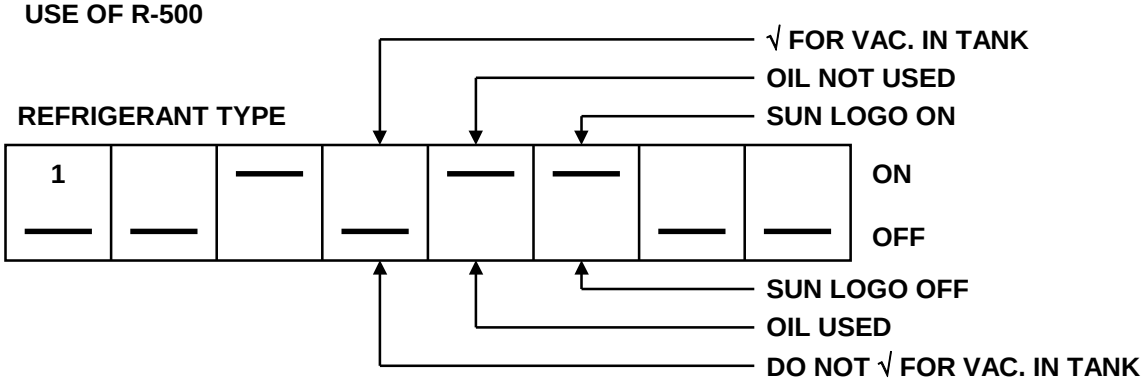
APPENDIX A
CONFIGURATION

MRC-400/MTC-4000 REFRIGERANT TYPE

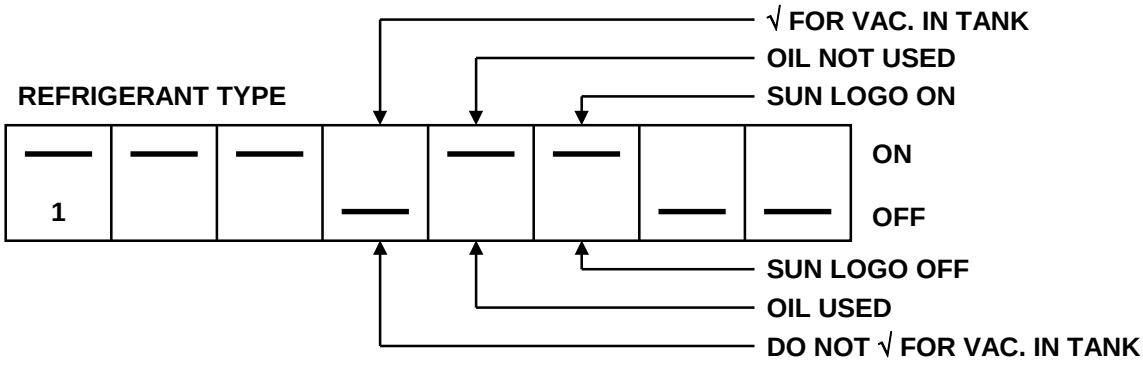
I. USE OF R-12



II. USE OF R-500

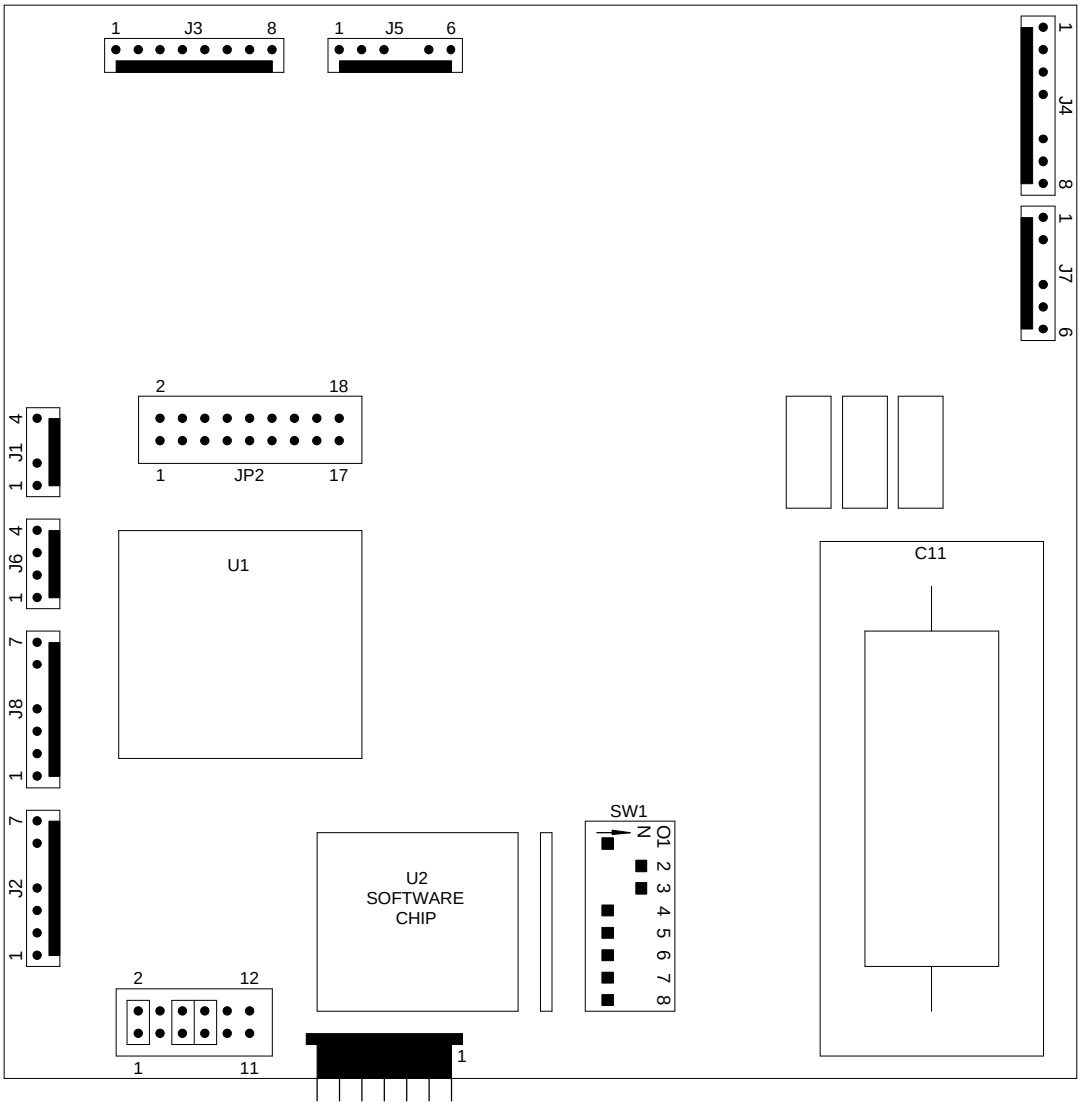


III. USE OF R-134a

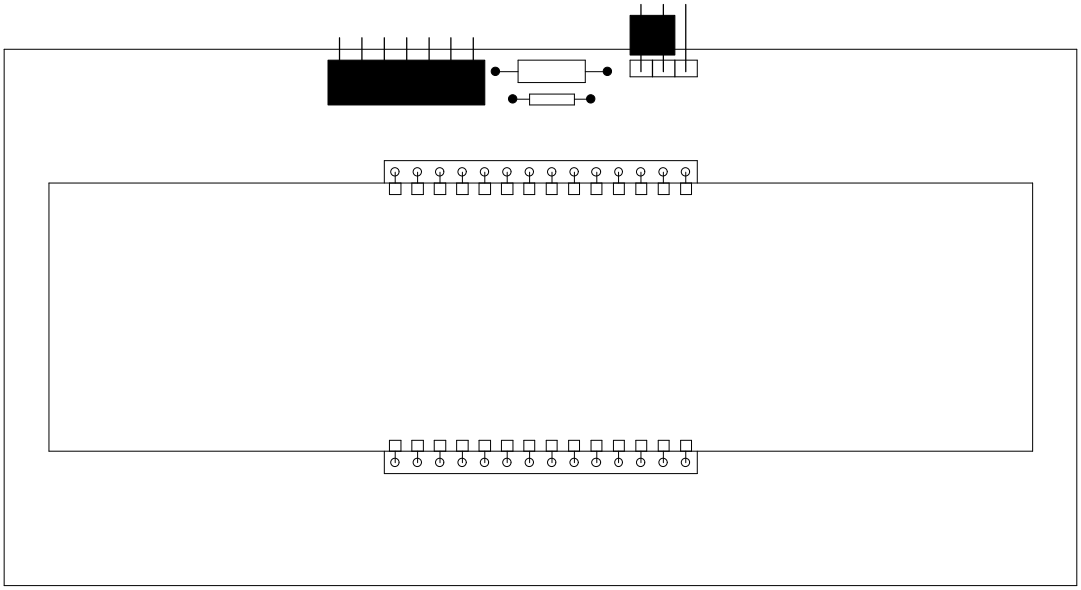


BOARD CONFIGURATIONS

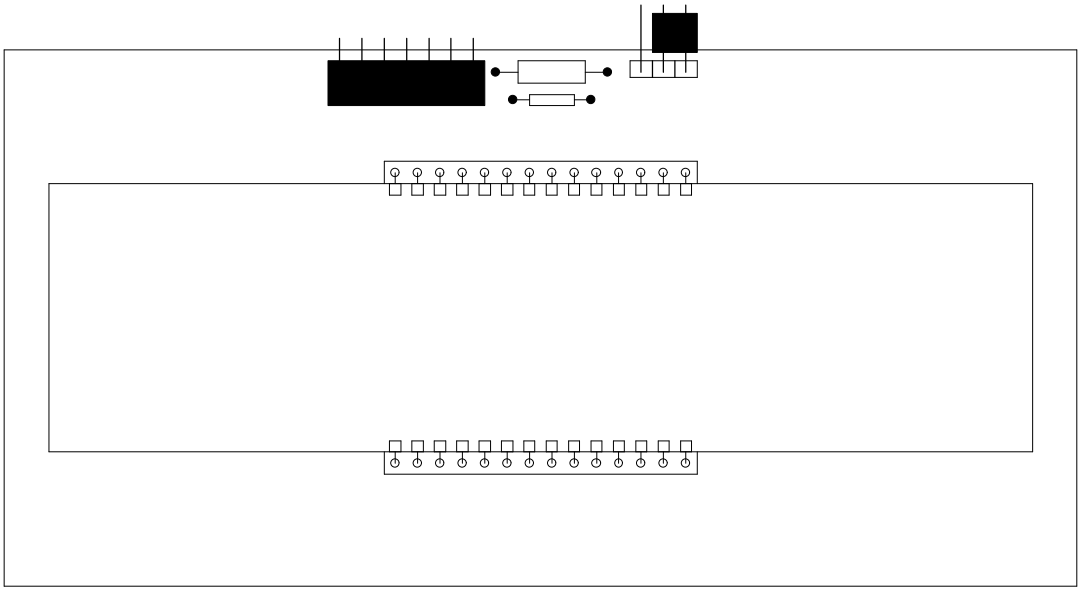
PROCESSOR BOARD 7001-2188-01



LEFT LCD DISPLAY BOARD 7001-2153-01



RIGHT LCD DISPLAY BOARD 7001-2153-01



APPENDIX B
ERROR CODES

The Refrigerant Recovery System has a self-diagnostic feature. When a malfunction with the Recovery System has been detected, an error code is displayed on the LCD panel.

A. Press **<HOLD/ENTER/RESTART>** on the front panel.

B. If the error code is still displayed, press **<CANCEL>** on the front panel to clear or turn "OFF" main power switch

C. Turn the power switch to the "ON" position and press **<POWER>**. This resets all functions.

D. If the error code is still displayed on the front panel, refer to Error Codes listed below:

ERROR CODES 0 THROUGH 12

ERROR CODE	DESCRIPTION	POSSIBLE CAUSE
0	Internal CPU memory failure.	• Replace Processor Board.
1	Communication Bus failure.	• Replace Processor Board.
2	Tank Full.	• Charge from or change Recovery Tank.
3	Software Failure.	• Replace Processor Board.
4	Solenoid Driver Failure.	• Replace Solenoid Driver Board.
5	No pressure after pump starts.	• Does Pump Start? • Check for leaks. • Check Purge Transducer.
6	Compressor windings open.	• Replace Compressor.
7	No weight drop during Refrigerant charge.	• Select other tank. • Check Heater Blanket on Virgin Tank. • With software Rev 1.20 or greater, install a new Virgin Tank.
8	No weight drop during Oil charge.	• With software Rev 1.20 or greater, install a new Oil Cylinder.
9	Stored weights and scale disagree.	• Not used with Rev 1.20 or greater software.
10	Scale weight less than 2 lbs.	• Refer to Scale Calibration in Chapter 3.
11	Scale weight greater than 155 lbs.	• Refer to Scale Calibration in Chapter 3.
12	Tank Full and Empty LEDs on.	• Connect Recovery Tank cable. • Ohm out cable. • Check Float Assembly in Recovery Tank.

ERROR CODES 13 THROUGH 24

ERROR CODE	DESCRIPTION	POSSIBLE CAUSE
13	Discharge pressure less than 30” HG.	• Check calibration. • Replace High Pressure Transducer. • Replace Solenoid Driver Board.
14	Discharge pressure greater than 500 psi.	• Check calibration. • Replace High Pressure Transducer. • Replace Solenoid Driver Board.
15	Suction pressure less than 30” HG.	• Check calibration. • Replace Low Pressure Transducer. • Replace Solenoid Driver Board.
16	Suction pressure greater than 200 psi.	• Check calibration. • Replace Low Pressure Transducer. • Replace Solenoid Driver Board.
17	Purge pressure less than 30” HG.	• Check calibration. • Replace Purge Pressure Transducer. • Replace Solenoid Driver Board.
18	Purge pressure greater than 500 psi.	• Check calibration. • Replace Purge Pressure Transducer. • Replace Solenoid Driver Board.
19	No Recovery Tank present.	• Install Recovery Tank. • Refer to User’s Manual.
20	No vacuum in new Recovery Tank.	• Check Dip Switch configuration.
21	No vacuum during Vacuum Hold test. (2” loss).	• Vehicle has a leak. Fix leak. • Check hose connections to vehicle. • Check Suction Separator gasket.
22	No vacuum during Vacuum Hold test, (2” loss).	• Vehicle has a leak. Fix leak. • Check hose connections to vehicle. • Check Suction Separator gasket.
23	Ambient Temperature less than 32°F.	• Let unit warm up. Operating temperature is: 50-120 degrees. • Replace Plumbing Board.
24	Ambient Temperature less than 150°F.	• Let unit cool down. Operating temperature is: 50-120 degrees. • Replace Plumbing Board.

ERROR CODES 25 THROUGH 30

ERROR CODE	DESCRIPTION	POSSIBLE CAUSE
25	Discharge Temperature less than 20°F.	• Connect Temperature Probe. • Replace Temperature Probe.
26	Discharge Temperature greater than 150°F.	• Calibrate Temperature Probe. • Replace Temperature Probe.
27	Incorrect refrigerant settings.	• Refer to Appendix A. • Replace Processor Board.
28	High pressure switch on.	• Reduce High side pressure. • Turn vehicle system off.
29	No Refrigerant Tanks charging.	• Install refrigerant tank.
30	No Oil Cylinder available for charging.	• Install a Oil Cylinder.

APPENDIX C
SOFTWARE/HARDWARE REVISION

This appendix will give a breakdown of each software revision. The first section list the revision of software and the modification for each chapter that it supports. Second section list the hardware changes for each revision.

SOFTWARE REVISIONS

REVISION 1.09

* New release.

REVISION 1.10

* Turns off completed LED during "SUC SEP" function. Inhibits auto sequence function.
* Eliminated 15 second wait after replacing Recovery Tank.
* Correct problem of not returning to recovery state if "SUC SEP" occurred during the Recovery mode.

REVISION 1.11

* Changed tank default to 30 pounds Virgin Tank.
* Added lbs. and oz. to charging amount selection.
* Unit select mode now defaults to previously selected units.
* Charge amounts now selectable by selecting lbs. or kgs. first, then selecting oz. or tenths of lbs.
* Changed Temp. Probe routine not to look at dip switch; displays ---- if temp. is out of range instead of flagging errors.
* Added dip switch settings (sw.#6) for SUN icon.
* Added 30lb. or 50lb. reclaim tank weight in default settings. Unit now displays weight of refrigerant when installing a non-empty reclaim tank.
* Added feature in amounts routine, to display amount charged during charge cycle and time remaining in vacuum time.

REVISION 1.12

* Hold LED was not kept on during Suc Sep cycle. It is now.

REVISION 1.13

* Changed zero level in CAL routine to not reclaim when calibrating if pressure is at zero, resistor in plumbing board changed.
* Changed zero offset voltage. Caused reclaim in CAL routine even if pressures were at zero. See Service Bulletin #708 for resistor verification.

REVISION 1.14

* **NOT RELEASED TO PRODUCTION**
* Fixed bug when cancelling out of vacuum hold, timer not reset. Even if no vacuum time, goes into vacuum for remainer of hold time.
* Check suc vac instead of suc pres for no vacuum at end of vacuum time.
* Added refrigerant MP52 purge tables.
* Added refrigerant types to pressure check routine for crossover valve on/off values in charge mode.
* Added one extra count to charge target weight to compensate for lost fractions.
* Fixed bug with pump pressure check on startup.
* Added 3 pass check on limits before flagging errors.
* Added 3 minute wait in cal routine to let transducer warm up.
* Added debounce on float and high pressure switches.
* Remove pump pressure check; did not work reliably.

REVISION 1.15

* Crossover valve now opens during reclaim mode when suction pressure reaches 0.
* Added feature to display amounts if in Error 7.
* Changed reclaim function to pull down to 15 in. hg. and rise to 5 in. hg.
* Added additional 15 in. hg. pull down after reclaim wait time.
* Added routine to monitor and reduce pressure insuciton seperator bowl if bowl was not removed when red light is on.
* Added flashing red light during background recovery mode.
* Added routine to check float switch in bowl to determine if float is really in the maintenance mode, or if a splash of refrigerant tripped the float. This mode will display "bol" on high side during the recovery mode for 3 minutes.
* Changed auto sequence to check both pressures before going to vacuum mode.

REVISION 1.20

* **All future versions will support new small oil separator**
* Eliminated error 9.
* Changed error 7 to handle accurate charging if tanks are changed during slow charge.
* Changed reclaim cycle to only purge if reclaim lasted more than 3 minutes.
* Added pressure check of recovery tank before charging.
* Changed upper tank pressure limit in reclaim to be purge pressure + 40psi for high pressure error.
* Added customer calibration routine to just calibrate transducers. (Press and hold **<HOLD/ENTER/RESTART>** for 5 seconds).

REVISION 1.21

* Changed timing on Oil Return/Bypass solenoid from 10 seconds to 5 seconds.
* Added 15 second to turn on suction separator solenoid in vacuum mode.

HARDWARE REVISIONS

LCD BOARD 7001-2153-01

REVISION A: (11-12-91); NEW RELEASE.

REVISION B: (08-30-93); Changed R1 to 1 megΩ, ¼ watt, 1%.

LED BOARD 7001-2159-01

REVISION A: (11-12-91); NEW RELEASE.

REVISION B: (06-03-93); Added Snap-on part numbers to print.

PLUMBING BOARD 7001-2185-01

REVISION A: (12-06-90); NEW RELEASE.

REVISION B: (04-28-91); Changed connector P-9.

REVISION C: (07-23-92); Changed R-7 to 3.01K for Max offset on transducer.

REVISION D: (10-22-92); Added comformal coated spec's.

REVISION E: (12-10-92); Changed A/D converter.

REVISION F: (09-20-94); Add two jumper wires to eliminate RF interference.

PROCESSOR BOARD 7001-2188-01

REVISION A: (12-06-91); NEW RELEASE.

REVISION B: (02-16-92); Added tie wrap to C1, C9 & C13 to secure to circuit board.

REVISION C: (04-09-92); Changed software program IC to a one-shot programmable.
Changed software from 1.09 to 1.10.

REVISION D: (08-11-92); Changed software from 1.10 to 1.13.

REVISION E: (09-24-93); Changed software from 1.13 to 1.14.

REVISION F: (09-24-93); Changed software from 1.14 to 1.15

REVISION G: (09-24-93); Added Snap-on part numbers to print.

REVISION H: (04-07-95); Changed software from 1.15 to 1.20

REVISION J: (06-07-95); Changed software from 1.20 to 1.21

REVISION CONTROL

	MINIMUM REWORK	MINIMUM REVISION	CURRENT REVISION
7001-2185-01	A	F	F
7001-2188-01	A	F	J
7001-2230-01	A	B	B
7001-2153-01	A	B	B

APPENDIX D
INSTALLATION INSTRUCTIONS

Appendix D is reserved for filing of Installation Instructions. When a kit is successfully installed in a unit, the Installation Instructions should be inserted here in alpha-numerical sequence.

At the bottom of each page of the instructions is the part number, the revision level and the date the instructions were printed. For example: 0692-2304-01 (01-15-95) REV A. is at the bottom. 0692-2304-01 is the number for the Installation Instructions; (01-15-95) is the date of printing; REV A is the original instructions. If a subsequent instruction is done, the Revision Level will change to the next letter and a new date will be applied.

Every time you get a new instruction, check the REV LEVEL and update this Appendix as necessary.

MODEL NUMBER	DESCRIPTION	INSTRUCTION NUMBER
1091-0288-01	Shut-Off Adapters for R-134a Units (NPR #62-2)	0692-2194-01
1091-0288-02	Shut-Off Adapters for R-134a Units (NPR #74)	0692-2194-01
1091-0301-01	2 oz. Oil Charge Kit for R-134a (NPR #71)	0692-2210-01
1095-0178-02	R-134a Filter Dryer Kit Series “A”	0692-2350-01
1095-0178-04	R-12 Filter Dryer Kit Series “A”	0692-2350-01
1095-0291-01	Oil Charge Capability Kit for R-134a	0692-2178-01
ACT-111B	2 oz. Oil Charge Kit for R-12	N/A
ARG04040	R-134a Vehicle Adapter O-Rings (NPR #100)	N/A
EAK0010C01A	Charge Vaporizer Kit for R-12 Units (NPR #80)	N/A
EAK0016C00A	Moisture Indicator Kit (SB #739)	N/A
EAK0024C00AB	Shut-Off Adapters for R-134a Units (NPR #91)	0692-2310-01
EAK0027C00AS	R-134a Vehicle Adapter O-Rings (NPR #94)	0692-2320-01
EAK0031C05AS	Software Update Kit for MRC-400/450 & MTC-4000/4500 (SB #753)	0692-2326-02
EAK0043C01AS	Software Upgrade Kit for MRC-400/450	0692-2357-01
MRC-400	Unit Setup	0692-2004-01
MRC-450	Unit Setup	0692-2005-01

INTRODUCTION

GENERAL

This service manual has four chapters covering the **MRC-400/450 & ACT-4100/4500** Mobile Recycling Center, and **MTC-4000/4500**. The serial B units will be refered to as MRC-400/450 or MRC / ACT. The manual covers the following topics: AC/DC Distribution, Theory of Operation / Troubleshooting, Maintenance and Calibration Procedures, and a Parts List.

Use the MRC-400/450, ACT-4100/4500, and MTC-4000/4500 capable of the following functions:

1. Reclaim, clean, and store refrigerant for reuse.
2. Pull a vacuum on an Air Conditioning System.
3. Accurately charge an Air Conditioning System with refrigerant.
4. MRC-400/ACT-4100/MTC-4000: Charges R-12, and R-500.
5. MRC-450/ACT-4500/MTC-4500: Charges R-134a.

NOTE: The following is a breakdown description for Serial Numbers:
Serial # Location - Rear Cabinet top right hand side.
Example: 0694B0101
06 Month MFG.
94 Year MFG.
B Serial Rev.
0101 Number of Unit.

NOTE: *SERIAL B SOFTWARE STARTS WITH 2.XX ON POWER UP.*

FUNCTIONAL DESCRIPTION

Auto Sequence: Press **<AUTO SEQUENCE>** to begin an automatic sequence: Recovery, Evacuate, Vacuum Hold, Oil charge and Refrigerant Recharge. The unit can automatically recall entries from the last AUTO SEQUENCE operation by pressing and holding the **<AUTO SEQUENCE>** for five seconds.

Reclaim Only: Press **<RECLAIM ONLY>** to recover refrigerant from the air conditioning system. Refrigerant gas enters the MRC-400's suction separator through two service hoses. The unit traps oil and solid contaminants at the bottom of the separator bowl. The pump pulls refrigerant gas from the top of the bowl. Then the pump compresses the refrigerant to a high-pressure gas. Next, the high-pressure refrigerant gas enters the condenser. Two continuously running fans blow air across the condenser. The air removes heat and condenses the high-pressure gas into a refrigerant liquid. The liquid flows out of the Condenser and through the Master Filter/Drier. The unit collects the refrigerant in the recovery tank. When the unit finishes recovering, the operator panel's green, COMPLETED LED lights. Unit can display exact amount of refrigerant recovered by pressing the **<AMOUNT>**.

FUNCTIONAL DESCRIPTION continue...

Vacuum: After you open a vehicle air conditioning system, you can't immediately recharge it. First, you must evacuate the system (pull it into a deep vacuum). The Air Conditioning system contains moisture. Pulling the system into a deep vacuum removes this moisture. Evacuating the system also removes the non-condensable gases remaining in the system. Only use the vacuum function when system pressure is "O". In the vacuum function, non-condensable gas enters the suction separator through both service hoses. The gas proceeds down to the pump vacuum, and out the pressure side of the pump. Then the unit expels non-condensable gas into the purge bottle.

Charge: The MRC-400/450, uses an electronic scale to measure refrigerant and oil charge. The scale is accurate to within 1/10th of an ounce. A heating blanket warms the virgin refrigerant in a 15/30/50 lb. cylinder increasing the pressure and speeding up a charge. Charging proceeds at about one pound per minute. The oil cylinder has a capacity of 20 ounces. The recovery tank and oil cylinder do not have heater blankets. Charging occurs when the computer board opens the reclaim solenoid. With refrigerant in the recovery tank, the open solenoid allows flow to service hoses. The unit charges until pressures equalize between the vehicle and the recovery tank. If the unit hasn't completely filled the system, the unit displays "slow charge." Then the unit switches over to virgin refrigerant and continues to charge. Charging stops when the scale weight loss equals the amount keyed in by the technician.

ELECTRONIC SAFETY PRECAUTIONS

When working on this tester, keep three points in mind:

- Tester voltages refer to the "return" (white) side of the AC line. Yet sometimes outlet wiring is backward. In that case, electronic ground connects to the "hot" side of the line. The tester operates normally, but the PC board floats 115 VAC above safety ground.
- Assume that points inside the tester chassis are at 115 VAC. Act appropriately. If you make measurements with grounded test equipment, use an isolation transformer. An oscilloscope is an example of such test equipment.
- MRC-400 testers are susceptible to power line spikes and noise. You must connect the equipment to safety ground, otherwise, the MRC-400's surge suppressors can't clip power line spikes properly. Does your machine do "strange things" or exhibit intermittent problems? Check for a proper ground at the machine and the power outlet. If you're using an extension cord, then check that, too. It must be constructed of at least 18 gauge wire and under 10 feet long.
- Schematic voltages refer to the "return" side of the line, not safety ground. When measuring voltage, use the white wire on the line power terminal block as ground. Don't use the three, center safety ground terminals. Another place you can access ground is at the shield. The black wire in the shielded transducer cables also connects to the ground return.

REFRIGERANT SAFETY WARNINGS

⚠ WARNING!

USE STANDARD REFRIGERANT HANDLING
SAFETY PROCEDURES WHEN PERFORMING INSTALLATION

ALWAYS WEAR SAFETY GOGGLES, DON'T SPILL OR TOUCH LIQUID REFRIGERANT, AVOID FLAMES, AND EXCESSIVE HEAT. USE ONLY IN WELL VENTILATED AREA.

When handling R-12 refrigerant, you must follow proper precautions. R-12 is extremely evaporative. Exposure to liquid R-12 can result in frostbite. Always use appropriate safety precautions while testing, operating, servicing or transferring R-12.

- **WEAR SAFETY GOGGLES.** When servicing or operating the tester, always wear safety goggles (0001-5005).
- **DON'T SPILL OR TOUCH LIQUID R-12.** If your skin contacts liquid R-12, you can develop frostbite. Evaporating R-12 removes latent heat from whatever it contacts. Open all fittings slowly to release pressure. Operate testing and service valves according to applicable instructions. If someone's skin comes into contact with liquid refrigerant, treat the skin for frostbite.
- **AVOID FLAMES.** Under normal conditions, R-12 is non-toxic. Yet an open flame reacts with R-12, producing phosgene gas. This is a well-known fumigant and highly toxic poison. NO SMOKING! A cigarette becomes hot enough to cause this reaction.
- **AVOID EXCESSIVE HEAT.** Within a refrigerant container, pressure rises with heat. Store containers upright, out of the sun and away from heat vents.
- **VENTILATION.** Adequate ventilation is essential for several reasons. The R-12 gas displaces air. Large quantities of R-12 in a confined space can cause suffocation. Also, when R-12 levels in the air are high, leak detection is difficult. Keep the MRC-400 unit in a well-ventilated area.

SERVICE GUIDELINES

- **BEFORE REPLACING** circuit boards, verify that the main power supply operates within specifications.
- **VERIFY** that board connectors are fully seated.
- **NEVER** remove boards or disconnect a connector with the power on!
- **MAKE SURE** that you completely understand what the tester does. *(If it works, you can't fix it!)* Refer to the *Operator's Manual*, application notes, and flow diagrams.
- **CONSULT** the Service Bulletin Binder. It may identify and explain how to correct the problem.
- **BE CAREFUL** when handling circuit boards! Wear an anti-static wrist strap.
- **WHEN TRANSPORTING** circuit boards, use anti-static bags.

HANDLING MOS IC'S AND THEIR STATIC SENSITIVE DEVICES

Most integrated circuits are high impedance devices. This characteristic makes them susceptible to damage by electrostatic charges. Large electrostatic charges tend to build up in low humidity environments. If you provide a discharge path through the IC, you may damage the IC.

To prevent needless failures, employ these techniques when handling static-sensitive devices...

- Until circuit boards are ready for use, keep them in their static-protective packaging.
- Never remove or insert boards when the machine is under power.
- The correct board removal procedure is as follows:
  - When you're repairing equipment, it must be grounded.
  - Wear your anti-static wrist strap. Connect it to the equipment chassis or nearest available ground. (Field Service Kits include a wrist strap and grounding cord (0552-0032-01).
  - Neutralize static voltage differences! Touch the chassis, or any metal part of the equipment.
  - Always grasp the board from two opposite edges with your forefingers.
  - Place removed boards on a grounded static-dissipative mat (part of the field service kit).
- When inserting boards into the equipment:
  - Remove the board from the original packaging on static dissipative material. If you must ship a defective board, save packaging material for reuse.
  - Be sure to remove power from the tester. When installing the replacement board, following above steps.
  - Pack defective boards in a shielded bag. Return the bag in the reusable container.
- Packing IC chips, or other static-sensitive devices: Use conductive foam or an equivalent, anti-static material with adequate physical protection.
- Avoid unnecessary contact with internal components.
- Avoid setting boards on static-prone insulating surfaces such as paper, glass, rubber or plastic.
- Beware of static generated by friction when...
  - Wearing silk or nylon garments.
  - Walking on carpets.
  - Scuffing shoes with rubber soles.

NOTICE

Relative humidity has a direct effect on static charge buildup. As humidity decreases, static buildup usually increases.

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CHAPTER 1
AC/DC POWER DISTRIBUTION

AC/DC THEORY OF OPERATION

⚠ WARNING!

DANGEROUS HIGH VOLTAGES
ARE PRESENT IN THIS EQUIPMENT

Always use the "One Hand Rule" when working with AC voltages by keeping one hand in your pocket or behind your back. Before removing wires from the MRC-400/450 / ACT-4100/4500, always verify that the Tester is "OFF". Turn off the Main Power Switch on the front panel and unplug the AC power cord from the AC outlet.

AC DISTRIBUTION

The primary voltage applies 110V, 60Hz AC to the MRC-400/450 / ACT-4100/4500 via the hot side (Black Wire) of the AC power cable. The Main Power routes to one side of the "ON/OFF" Front Panel Power Switch/Circuit Breaker (15A). The hot wire continues to one side of the Line Filter. The common side routes to the other side of the Line Filter. The earth ground directly connects to the units chassis.

With the unit connected to an AC source, AC is supplied to the ON/OFF Switch. With the Main Power Switch "ON", 110VAC routes to the following:

Line Filter (HOT/COMMON) Terminal Block (HOT/COMMON)
Transformer (HOT/COMMON) Relay Board (HOT)

Once **<POWER>** is pressed on the front panel, 110VAC is routed to the following:

Fans, Condenser (HOT) Heater Blanket (HOT) Circuit Boards

COMPRESSOR OPERATION

In the Recovery/Vacuum Mode, the Pump pulls a vacuum and evacuates refrigerant from the vehicle. The Plumbing Board activates Relay (K1) on the Relay Board that supplies 110VAC to the Thermal Overload Breaker (Klixon-Normally Closed). The AC is then routed to both windings (TOP PIN C), on the compressor. AC is then routed through the start and motor windings to pin 3 and pin 5 (Compressor Relay K1 coil). AC neutral line is connected to terminal "1" on K1 coil and to one side of the internal contact. Once the compressor builds up enough current, K1 coil will energize and close the contacts from pin 1 to pin 2. The suppression cap assembly is connected to terminal "1" and "2" to suppress noise on start up. The start capacitor produces a phase shift allowing the compressor to start. Once the compressor gets up to speed, the current through the motor windings will decrease and disengage K1. Once K1 is disengaged, the contacts will open and the AC neutral line will be removed from the start winding.

TRANSFORMER OPERATION

The transformer converts 110 volts AC down to 24 volts, 15 volts, and 5 volts AC. These AC lines are protected with three fuses. All three AC voltages are supplying power to the Processor Board at J4 pins 1 & 2, 3 & 4, 5 & 6. With the Main Power switch in the ON position, the Processor Board has power.

RELAY BOARD

A.C. voltage from the Main Power switch is applied directly to one side of the contacts on relay K1 and K2, located on the Relay Board. When the relays are energized, AC voltage is routed to the compressor through K1 and to the condenser fans and heater blanket through K2.

DC DISTRIBUTION

PROCESSOR BOARD

The Processor Board has three bridge rectifiers and one 5 volt regulator. D1 bridge rectifier converts 5 volts to 12VDC and supplies voltage to the 5 volt regulator. The 5 volts is used for the standard components and IC's for power. D2 bridge rectifier converts 15VAC to 15VDC and supplies voltage to the 15 volt regulator located on the Plumbing Board via J7 pin 1 to J1 pin 1. D3 bridge rectifier converts 24VAC to 24VDC and supplies voltage to the audible Alarm. The 24VDC supplies voltage to K1 and K2 on the Relay Board, Smart Drivers with Self Test for Solenoids on the Plumbing Board.

PLUMBING BOARD

The Plumbing Board has a 15VDC regulator, that is used to power the Ambient Temperature Sensor (built in the board), Load Cell (Scale), and external Temperature Probe (temperature of A/C system in car). The 15VDC regulator is powered by the unregulated 15VDC from D2 bridge rectifier located on the Processor Board. The 5VDC supplies voltage to the Transducers, and switches monitored by a pull up resistor on each line.

LCD BOARD

The LCD Board is powered by +5 VDC from the 5 volt regulator on the Processor Board. The +5VDC is derived from J2 pin 6 to J1 pin 6 on the LCD Board (left) and from J8 pin 6 to J1 pin 6 on the LCD Board (right).
LED Board.
The LED Board is powered by +5 VDC and +12 VDC supplied from the Processor Board. The +12VDC is used to power the LED's.

RELAY BOARD

The Relay Board has two 24 volt relays on it, K1 and K2. The +24VDC is derived from J12 pin 2 on the Plumbing Board. This 24 volts is supplied to both relay coils, through diodes. The output port IC. located on the Plumbing Board supplies a return path to complete the return side of K1 coil, so the relay is energized. When energized, the switch contacts will be closed allowing A.C. voltage to power the Fans and Heater Blanket. When the return side of K2 coil is completed, the relay is energized causing the switch contacts to be closed allowing A.C. voltage to power the compressor.

SOLENOID OPERATION

The solenoids are powered by +24VDC from D3 bridge rectifier. The +24VDC is derived from J1 pin 4. K1 allows the SOL GND to pass through the normally closed High Pressure Switch to Q2 emitter. Q2 is turned on with the +5VDC supply to connect the emitter to the collector side. The collector side is connected to the coil of K1 to allow the relay to close the contacts, that allows SOL GND to all solenoids.

LOAD CELL

The load cell is powered by +10 volt DC at J10 pin 2 & 7, supplied from the +15 volt circuit. The load cell is a device that measures weight.

AMBIENT TEMPERATURE

The Ambient Temperature is powered by +15 volt DC. This sensor is routed from the Plumbing Board to the Velcro strap on the Recovery tank. It is used to determine temperature of the tank which is then calculated into pressure. This reading is how the unit determines Purge pressure.

EXTERNAL TEMPERATURE PROBE

The Temperature Probe is powered by +15 volt DC through J9 pin 1. Temperature Probe is used to measure the temperature in the vehicle.

ALARM

The alarm is powered by the 24 volt DC voltage at J1 pin1. A beeper driver is used to sound the alarm when the buttons are pressed, or if an error code is displayed.

HIGH/LOW/PURGE PRESSURE TRANSDUCER

The Pressure Transducers are powered by +5 volt DC through J11 pin 1, 6, & 11 on the Plumbing Board. These transducers are used to monitor pressure and vacuum readings on the vehicle or the Recovery Tank.

NORMALLY OPEN SWITCHES

The switches are supplied power by +5 volt pull-up resistors on J2 pins 9, 7, 11, J3 pins 1, 5, & 7. Once a switch is closed, the switch will have zero volts on both sides of the switch. When the switch re-opens then +5 volts will be on one side of the switch and ground on the other.

RECOVERY TANK SWITCHES

The Recovery Tank has a float assembly inside of the tank to determine the level of refrigerant. The lower float is normally open and has a 5 volt pull up resistor via J2 pin 5 to monitor the status of the float. The upper float is normally closed and also has a 5 volt pull up resistor via J2 pin 1 to monitor the status of the float.

CHECK OUT PROCEDURE

There is not a calibration procedure for the Plumbing Board or the Display/Control Board. The only thing available is a quick voltage check.

TRANSFORMER CHECK OUT PROCEDURE

1. Using a DVM in AC mode, connect both leads across J4 pins 1 and 2. Voltage reading should be≈5 to 8 volts AC.
2. Connect both leads across J4 pins 3 and 4. Voltage reading should be≈15 to 20 volts AC.
3. Connect both leads across J4 pins 7 and 8. Voltage reading should≈20 to 24 volts AC.

If the above voltage readings are not correct, disconnect J4 from Processor Board and try again. If voltages are still out of range, replace Transformer.

PROCESSOR BOARD CHECK OUT PROCEDURE

1. Using a DVM in DC mode, connect the BLACK lead to ground on the board.
2. Connect the RED lead to J2 pin 6. Voltage reading should be≈5 volts ±0.05 volts.
3. Connect the RED lead to J5 pin 5. Voltage reading should be≈12 volts ±1 volt.
4. Connect the RED lead to J7 pin 1. Voltage reading should be≈15 volts ±1 volt.
5. Connect the RED lead to J1 pin 1. Voltage reading should be≈24 volts ±1 volt.

PLUMBING BOARD CHECK OUT PROCEDURE

1. Using a DVM in DC mode, connect the BLACK lead to ground on the board. (SP-3)
2. Connect the RED lead to J9 pin 1. Voltage reading should be≈15 volts ±0.05 volts.
3. Connect the RED lead to J10 pin 2. Voltage reading should be≈10 volts ±0.05 volts.

NOTE: IF THE VOLTAGES ARE NOT CORRECT REMOVE CONNECTORS FROM PCB & TRY AGAIN.

TROUBLESHOOTING

COMPLAINT	CORRECTIVE ACTION
I. Machine will not power up.	Is the machine plugged in and rear panel switch on? • Plug machine in and turn on. Is 110VAC present at the power strip • Check wall receptacle. • Check ON/OFF/Circuit Breaker. • Check Power Cord. Does 24 VAC transformer output read 24VAC ± 2VAC ? • Replace Transformer. Are voltages present at J4 on Processor Board? Refer to Transformer Check Out Procedure on Page 1-3. • Replace fuse on power supply. • Replace Processor board. • Replace board causing load.
II. ERROR 4	Perform Solenoid Diagnostic Test with front panel power switch OFF, rear ON. Activate by pressing Down arrow and Power buttons at same time. (Refer to Chapter 3.)
III. ¼ Amp Fuse Blowing.	Electrical noise from pump can cause symptom. Add R14, 22 ohm, 3 watt resistor (0684-0686-04) to compressor filter cap. See Service Bulletin #717.
IV. No Fan, No Compressor.	Checkout Circuit breaker ON/OFF switch and Relay Board.
V. No Beep, unit functioning properly.	Check for 24 volts DC at Beeper. If OK, change Processor Board. (See Functional Block Diagram).

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MAIN POWER SWITCH
CIRCUIT BREAKER

AC PLUG
HOT
GND
NEUTRAL
RV2
RV3
RV1
LINE FILTER

TB1
T1 TRANSFORMER
BLK/WHT
BLK/YEL
BLK
BRN/WHT
BRN/YEL
BRN
RED
BLUE
ORANGE
F1
F2
F3

J4
15VAC
5VAC
24VAC

+15VDC
+12VDC
+24VDC
D2
D1
D3

PROCESSOR BD.
7001-2188-02

JUMPER BLOCK
LCD BD. 7001-2153-01 (LEFT)
LCD BD. 7001-2153-01 (RIGHT)
U1 LCD DRIVER

LED BOARD
7001-2159-01
U1
U2
U3
U4
R1-R15
D1-D15
LED*

HEATER BLANKET
FAN
NEU
HOT
NEUTRAL

COMPRESSOR ASSY.
PROTECTOR
C
S
M
K1
C1
C2
R1

RELAY BD. 7001-2230-01
K1
K2
D1
D2
J1

FAN*/HEATER*
+24VDC
PUMP*
OUTPUT PORT
PUMP SENSE

BEEP DRIVER
ALARM
SOL. GND
+15V
+5V
+12V
VI
VO
GND

J7
SMART DRIVERS WITH SELF TEST
OUTPUT PORT
INPUT PORT

S9 VIRGIN
S10 RECOVERY
S13 LIQUID
S12 ZERO
S8 OIL
S7 X-OVER
S6 VACUUM
S5 SS
S1 CONDENSOR
S4 OIL RETURN\BYPASS
S14 PURGE
S3 VENT
GND
GND
GND

HIGH PRESS. SW.
N/U
GND
EXTERNAL TEMPERATURE PROBE
Q2
K1

J12
J11
J10
J9
J13

PULL UP
HIGH PRESSURE TRANSDUCER
LOW PRESSURE TRANSDUCER
PURGE PRESSURE TRANSDUCER
SS PRESSURE SWITCH
SS FLOAT SWITCH
LAMP +5 VOLTS
SUCTION SEPARATOR SERVICE SWITCH
RECOVERY TANK NOT FULL*
RECOVERY TANK EMPTY
OIL ON
VIRGIN ON
RECOVERY ON
LOAD CELL
RECOVERY TANK
AMBIENT TEMPERATURE SENSOR
GRN
BLU
BLK
BRN
SHEILD
YEL
RED

PLUMBING BD. 7001-2266-01

COMPRESSOR RESISTANCE CHECK: (WITHOUT RELAY)

C to S = 8 ohms
C to M = 4 ohms (1/2 of C to S)
S to M = 12 ohms (CS + CM)

C1 = START CAP
C2 & R1 = SUPPRESSION CAP ASSY.

K1 = COMPRESSOR RELAY
PIN 5 ON RELAY CONNECTED TO MOTOR WINDING ON BACK SIDE

S1-S6, S8-S13 NORMALLY CLOSED
S7 & S14 NORMALLY OPEN
S2 & S11 NOT USED

HIGH PRESSURE SWITCH
NORMALLY CLOSED
OPENS AT 450 psi
CLOSES AT 375 psi

SS PRESSURE SWITCH
NORMALLY OPEN
CLOSES AT 20 psi
OPENS AT 10 psi

SS FLOAT SWITCH
NORMALLY OPEN
CLOSES AT 10oz. OF OIL

SS SERVICE SWITCH
NORMALLY OPEN
CLOSES WHEN DEPRESSED

RECOVERY TANK
UPPER FLOAT
NORMALLY CLOSED
OPENS WHEN TANK IS FULL

LOWER FLOAT
NORMALLY OPEN
CLOSES AROUND 6 lbs. OF REFRIGERANT

OIL SWITCH
NORMALLY OPEN
CLOSES WHEN TANK IS INSTALLED

VIRGIN SWITCH
NORMALLY OPEN
CLOSES WHEN TANK IS INSTALLED

RECOVERY SWITCH
NORMALLY OPEN
CLOSES WHEN TANK IS INSTALLED

SUN ELECTRIC CORPORATION
One Sun Parkway
Crystal Lake, Illinois 60014 U.S.A.

MODEL: MRC-400/450	DWG REV: 0695 REV A.
DWG BY: T. WILSON	CHK BY: E. ZOFINSKI / T. WILSON

TITLE:
SERIAL "B"
AC/DC DISTRIBUTION

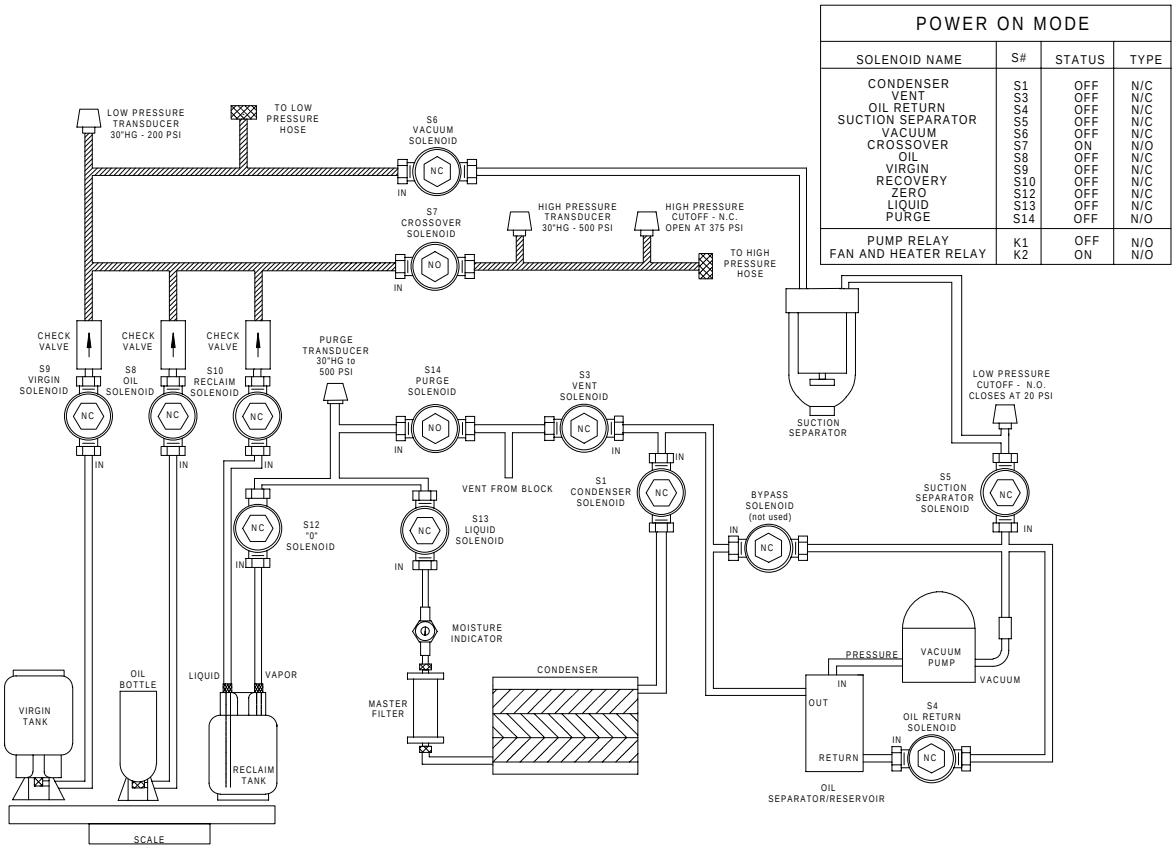
DWG:	PAGE:
1-1	1-5/6

CHAPTER 2
THEORY OF OPERATION

OPERATING MODES FOR SERIAL "B"

POWER ON MODE

The Power On Mode is activated by turning on the Main Power switch located on back of the unit; one short beep is sounded. Then press the front panel **<POWER>,** for 3 seconds; a beep is sounded. When the MRC / ACT is turned "ON", all segments on both displays will be ON. The software Rev. number will be displayed for about 3 seconds. The Liquid and Crossover solenoids will be powered and closed (N.O. solenoids). K2 on the Relay Board will also be energized, thus turning on the Fans and Heater.
The Heater Blanket is used to heat the virgin tank. Increasing the temperature of the tank raises the pressure in the cylinder, thus providing a quicker charge rate. The nominal operating temperature for the blanket is 120°F ±10°. A temperature regulator is built into the heater blanket and is not intended to be serviced.



POWER ON MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
VENT	S3	OFF	N/C
OIL RETURN	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSSOVER	S7	ON	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECOVERY	S10	OFF	N/C
ZERO	S12	OFF	N/C
LIQUID	S13	OFF	N/C
PURGE	S14	OFF	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-1 POWER ON MODE

AUTO SEQUENCE MODE

In this Mode the MRC / ACT will automatically recover the system, recycle the refrigerant , evacuate, check the system for leaks, and recharge the system. The operator enters the Auto Sequence Mode by first depressing **<AUTO SEQUENCE>,** at which time the "VACUUM TIME", "AUTO SEQUENCE" and the "HOLD" lights will turn ON. The operator will then:

1. Press and hold the **<VALUE ADJUST>** until the specified "VACUUM TIME" is indicated on the right display.
2. Press the **<HOLD/ENTER/RESTART>** to enter that number.
3. Repeat steps 1 and 2 for entering the "HOLD TIME" and the "CHARGE AMOUNT". To take the unit out of the "HOLD" state, and activate the "AUTO SEQUENCE" test, press **<HOLD/ENTER/RESTART>**. For more information, refer to the "AUTO SEQUENCE FLOW CHART" in appendix E of the Operator's Manual.

RECLAIM LOW, HIGH MODES

NOTE: *Only in the discussion of the Reclaim Cycle will the purpose and operation of individual components be discussed. It is recommended that in reading the following material, the Pneumatic and Functional Block diagrams be used as a reference.*

In the Reclaim Mode, Vacuum, Suction Separator, Condenser, Liquid and Zero solenoids are OPEN, and the Vacuum Pump, Fans and Heater will be ON. With High and Low pressure hoses connected to the vehicle being serviced, the MRC/ACT will attempt to recover refrigerant through both hoses. If the pressure in the high pressure hose, which is being monitored by the High Pressure Transducer, exceeds 120 psi**,** then the Crossover Solenoid will be CLOSED**,** RECLAIM HIGH mode. Crossover Solenoid is OPENED if the discharge pressure is less than 110 psi. This is also controlled by temperature, below 60º Crossover Solenoid is CLOSED, RECLAIM HIGH. The Pump runs until the suction and discharge pressure are both less than 4 inches of vacuum (4 hg)**,** if software is less then 2.08**.** 2.08 software and above, vacuum is pulled to 15 inches (15 hg). The system then waits approx. 2 minutes (depending on ambient temperature) for a rise in pressure, in order to boil off any residual refrigerant. If no rise in pressure occurs the system will beep twice and the Green "COMPLETED" LED on the Control Panel will be lit. If rise occurs, it is refered to “RESIDUAL RECOVERY”.

The low and high pressure transducers monitor the pressures when connected to a vehicle. These transducers output a voltage proportional to the amount of pressure being sensed. The suction side transducer outputs .00025 (.25 millivolts) per psi and the discharge and purge transducers output .0001 (.1 millivolt) per psi. **(EXAMPLE: LOW : 70PSI IS EQUAL TO .0175V. HIGH 70PSI IS EQUAL TO .007V.)** Since most field equipment cannot measure such low voltages, the amplified signal would have to be measured on the plumbing board. (See page 3-2 Transducer Checkout Procedure)

As the recovered refrigerant flows through the low and high sides and into the Vacuum solenoid to the Suction Separator, the Vacuum solenoid is being pulsed to control the amount of refrigerant going into the Suction Separator bowl. This helps prevent frost/liquid build up in the Suction Separator bowl, and reduces the amount of oil being discharged from the vehicle. Pulsing of the Vacuum solenoid will be activated when pressure in Suction Separator bowl is above 20 psi (OFF) and below 10 psi. (ON).

NOTE: *Pulsing of the Vacuum solenoid does not lengthen reclaim time.*

RECLAIM LOW, HIGH MODES continue...

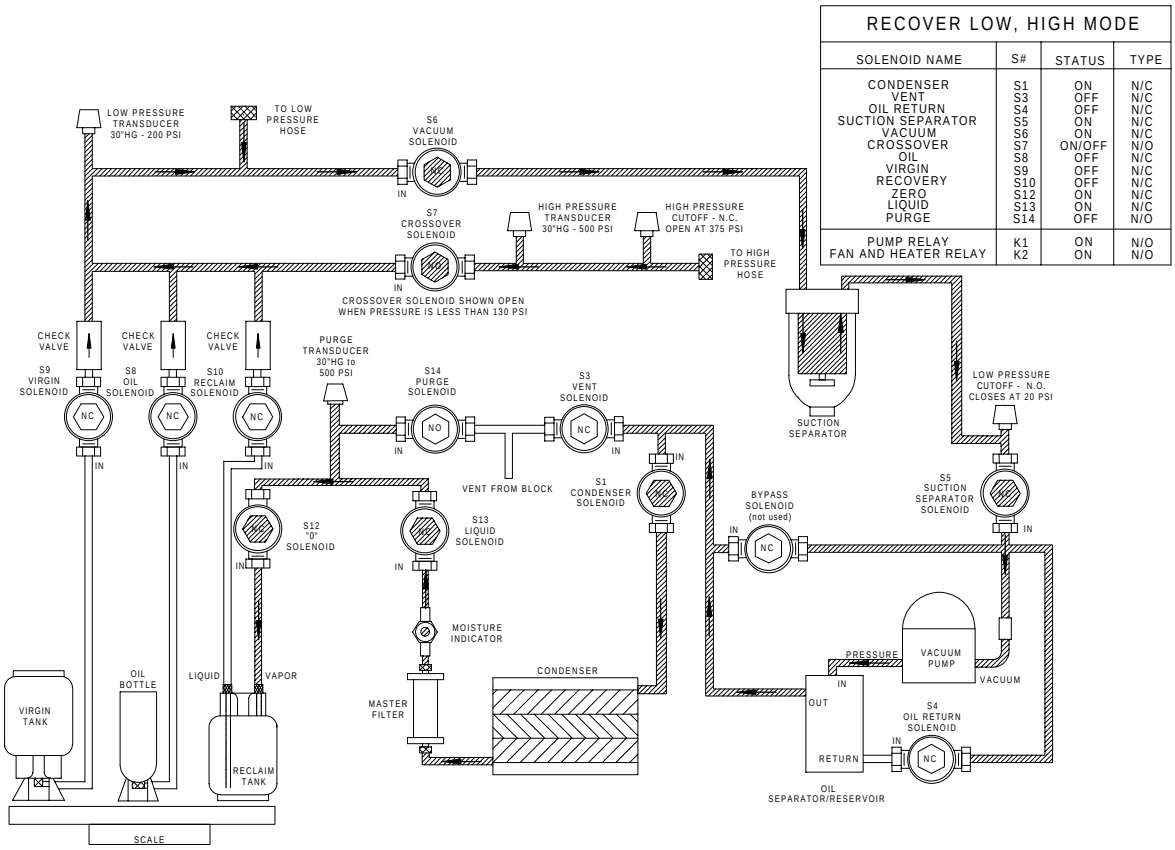
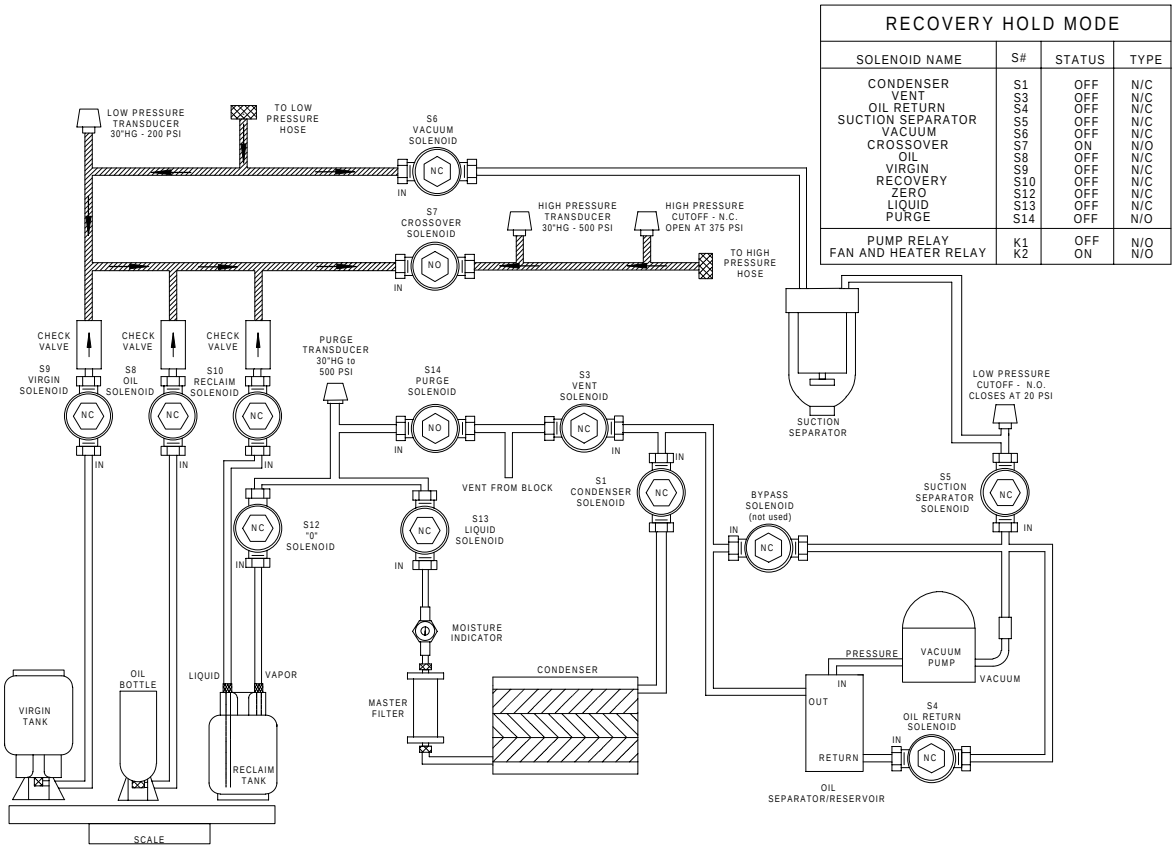

RECOVER LOW, HIGH MODE
SOLENOID NAME | S# | STATUS | TYPE
CONDENSER | S1 | ON | N/C
VENT | S3 | OFF | N/C
OIL RETURN | S4 | OFF | N/C
SUCTION SEPARATOR | S5 | ON | N/C
VACUUM | S6 | ON | N/C
CROSSOVER | S7 | ON/OFF | N/O
OIL | S8 | OFF | N/C
VIRGIN | S9 | OFF | N/C
RECOVERY | S10 | OFF | N/C
ZERO | S12 | ON | N/C
LIQUID | S13 | ON | N/C
PURGE | S14 | OFF | N/O
PUMP RELAY | K1 | ON | N/O
FAN AND HEATER RELAY | K2 | ON | N/O
LOW PRESSURE TRANSDUCER 30"HG - 200 PSI
TO LOW PRESSURE HOSE
S6 VACUUM SOLENOID
HIGH PRESSURE TRANSDUCER 30"HG - 500 PSI
HIGH PRESSURE CUTOFF - N.C. OPEN AT 375 PSI
S7 CROSSOVER SOLENOID
TO HIGH PRESSURE HOSE
CROSSOVER SOLENOID SHOWN OPEN WHEN PRESSURE IS LESS THAN 130 PSI
CHECK VALVE
CHECK VALVE
CHECK VALVE
S9 VIRGIN SOLENOID
S8 OIL SOLENOID
S10 RECLAIM SOLENOID
PURGE TRANSDUCER 30"HG to 500 PSI
S14 PURGE SOLENOID
S3 VENT SOLENOID
SUCTION SEPARATOR
LOW PRESSURE CUTOFF - N.O. CLOSES AT 20 PSI
VENT FROM BLOCK
S1 CONDENSER SOLENOID
BYPASS SOLENOID (not used)
S5 SUCTION SEPARATOR SOLENOID
S12 "0" SOLENOID
S13 LIQUID SOLENOID
MOISTURE INDICATOR
CONDENSER
PRESSURE
VACUUM PUMP
VACUUM
OIL BOTTLE
LIQUID
VAPOR
VIRGIN TANK
MASTER FILTER
IN
OUT
S4 OIL RETURN SOLENOID
RETURN
RECLAIM TANK
OIL SEPARATOR/RESERVOIR
SCALE

FIGURE 2-2 RECOVERY LOW, HIGH MODE

The Desiccant bag in the Suction Separator is designed to be the first stage in removing moisture from the refrigerant. As refrigerant enters the Suction Separator any Oil and solids separate and remain in the bowl. The refrigerant vapor is then pulled from the Suction Separator bowl by the compressor, which pressurizes it and passes through to the Oil Separator. Inside the Oil Separator the vaporized oil cools and collects. The recovered refrigerant vapor passes from the Oil Separator to the Condenser solenoid, the recovered gas flows through the Condenser where it is cooled and converted to a liquid. The liquid then enters the Master Filter / Dryer. This Filter / Dryer contains a internal 10 micron filter on the inlet and outlet with desiccant between the two filters. This is the last step to remove any moisture or other impurities. The recycled refrigerant flows through the filter and dries it then enters the Moisture Indicator. The Moisture indicator, located on the bottom left hand front corner of the machine, will indicate if there is any moisture in the recycled refrigerant. This is located in the lower section due to water is heavier than refrigerant. The recycled refrigerant flows through the Liquid solenoid, and enters an area where the Purge Transducer can monitor the pressure. (See Table on Page 2-7). Finally the recovered recycled refrigerant will empty into the vapor side of the recovery tank.

RECOVERY HOLD MODE

In Reclaim Hold the Condenser, Liquid and Zero solenoids are ON, allowing the Transducer to maintain constant readings. The Vacuum Pump is OFF. In this cycle the MRC/ACT will hold a vacuum between 30 and 170 seconds, depending on ambient temperature. This is to determine if there may be residual refrigerant still in the system. During this time, if suction or discharge pressure exceeds **2 psi,** the Pump is started. The unit enters recovery until both the suction and discharge pressure are below 4 inches of vacuum **(4 hg),** if software is less then 2.08**.** 2.08 software and above, vacuum is pulled to 15 inches (**15 hg**). Both displays will show continuous measurements for the high and low sides. At the end of this cycle the unit will proceed to the next cycle.

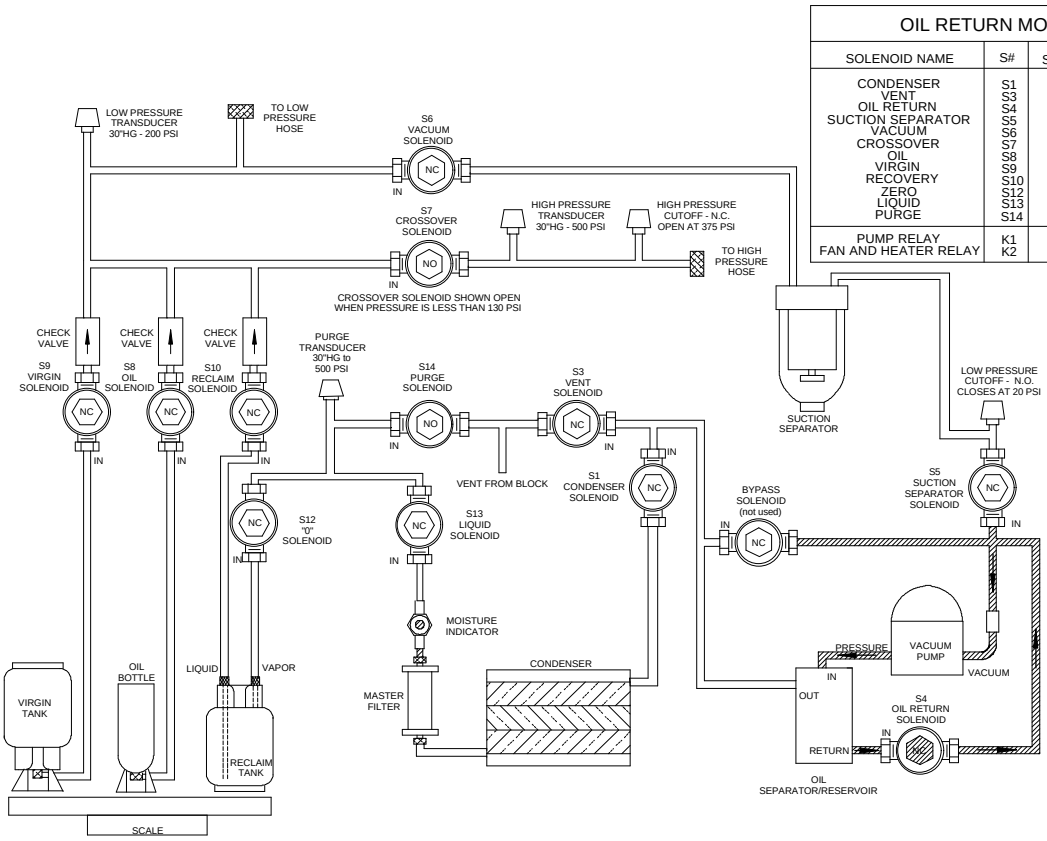


RECOVERY HOLD MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
VENT	S3	OFF	N/C
OIL RETURN	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSSOVER	S7	ON	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECOVERY	S10	OFF	N/C
ZERO	S12	OFF	N/C
LIQUID	S13	OFF	N/C
PURGE	S14	OFF	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-3 RECOVERY HOLD MODE

OIL RETURN MODE

As the compressor functions, small amounts of oil is carried off with the compressed refrigerant. This oil is collected in the Oil Separator. Every time the pump cycle ends the unit will energize (open) the Oil Return solenoid for 5 seconds. This allows any oil to flow back to the Vacuum side of the pump. This operation will keep the correct amount of oil in the pump for the most effective method of cooling and lubrication. At the beginning of the Vacuum cycle this solenoid is open again for 5 seconds. Oil Separator does not require any oil. (Requires 2.21 software).

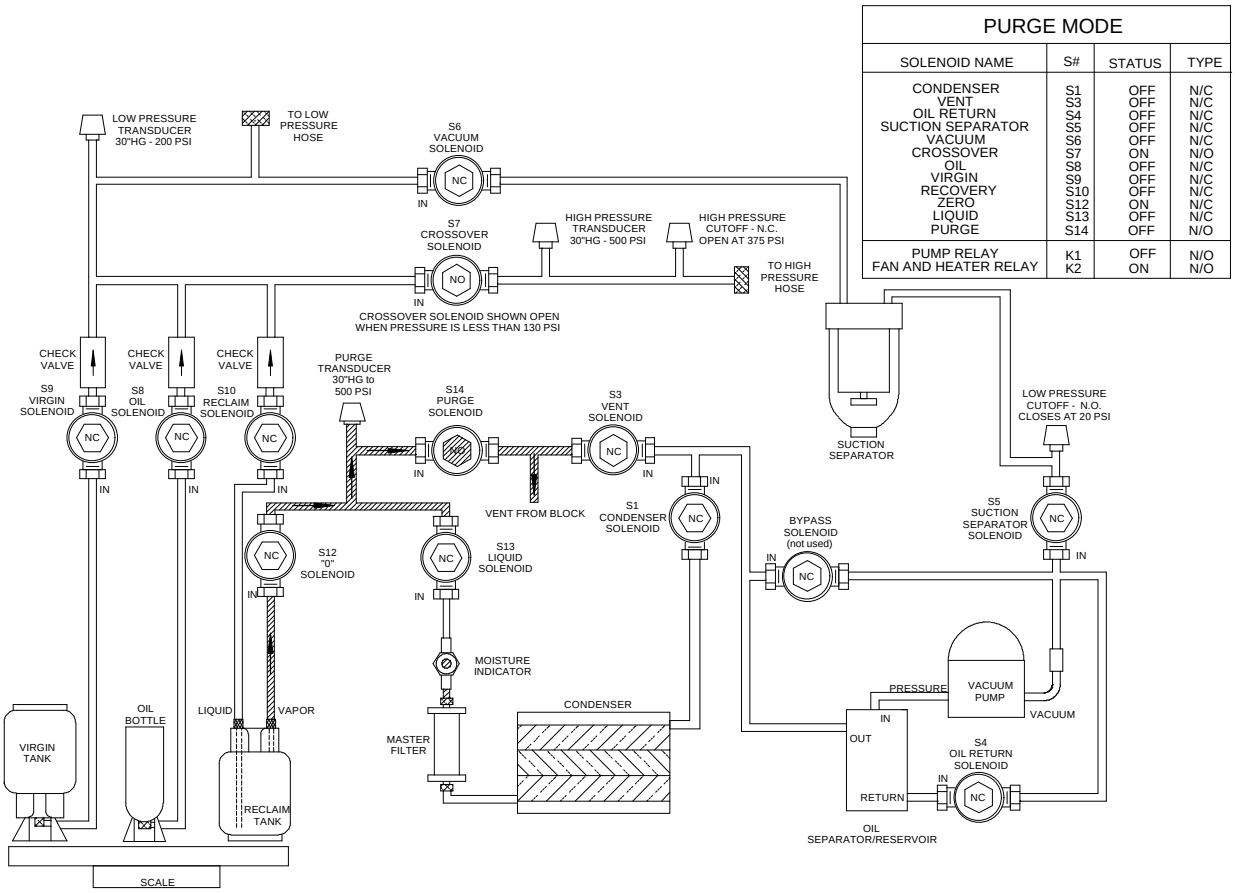


OIL RETURN MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
VENT	S3	OFF	N/C
OIL RETURN	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSSOVER	S7	OFF	N/O
OIL	S8	ON	N/C
VIRGIN	S9	OFF	N/C
RECOVERY	S10	OFF	N/C
ZERO	S12	OFF	N/C
LIQUID	S13	OFF	N/C
PURGE	S14	OFF	N/O
PUMP RELAY	K1	ON	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-4 OIL RETURN MODE

PURGE MODE

The purpose of the Purge cycle is to remove non-condensables (Air) from the Recovery Tank. At the end of each recovery the MRC / ACT will first prepare for the Purge by CLOSING the Crossover, Condenser and Liquid solenoids. The Purge and Zero solenoids OPEN next, emptying the non-condensables from the top of the recovery tank into the rear of the unit. The Operator will hear a pulsing of the Purge solenoid. In between each pulse the unit monitors the Purge transducer until pressure is below purge state. The ambient temperature sensor is monitoring the recovery tank and using the "Temperature / Pressure" relation. The Fans and Heater are ON for the entire Purge cycle. The amount of non-condensables that escapes during the Purge Cycle depends on the Temperature of the Ambient Temperature Sensor. The unit will always Purge down to the refrigerant temperature versus pressure plus 10 to insure there are no non-condensables in the unit. (Ambient Temperature vs. Pressure, See page 2-7)



PURGE MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
VENT	S3	OFF	N/C
OIL RETURN	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSSOVER	S7	ON	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECOVERY	S10	OFF	N/C
ZERO	S12	ON	N/C
LIQUID	S13	OFF	N/C
PURGE	S14	OFF	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-5 PURGE MODE

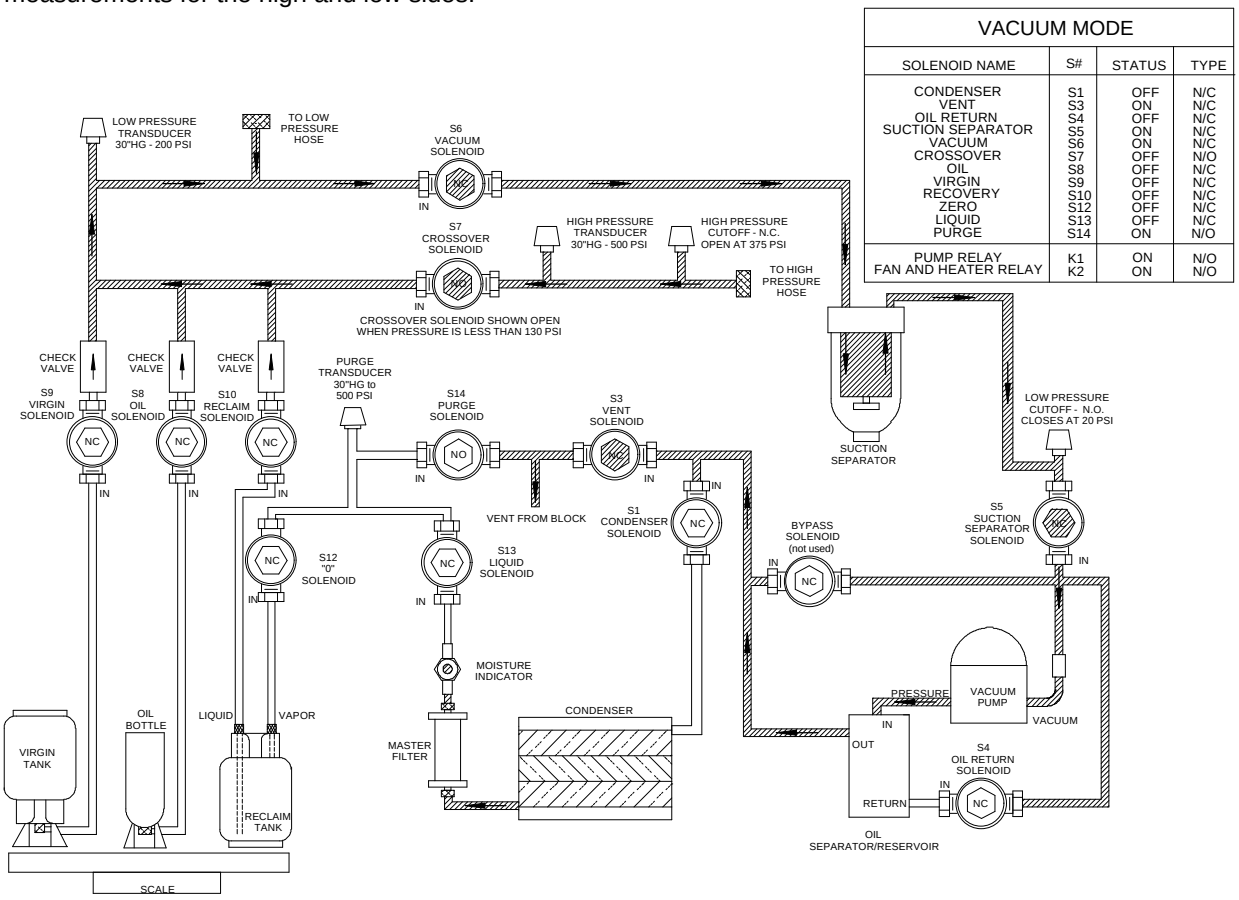
REFRIGERANT VAPOR PRESSURE CHART

R12 TEMPERATURE / PRESSURE CHART Unit will purge down to Vapor pressure plus 10psi.			
54°F = 51.02PSI	70°F = 70.20PSI	84°F = 90.20PSI	98°F = 113.48PSI
57°F = 54.38PSI	72°F = 72.92PSI	86°F = 93.30PSI	100°F = 117.00PSI
60°F = 57.80PSI	74°F = 75.64PSI	88°F = 96.50PSI	104°F = 124.52PSI
62°F = 60.20PSI	76°F = 78.44PSI	90°F = 99.70PSI	108°F = 132.28PSI
64°F = 62.60PSI	78°F = 81.32PSI	92°F = 103.50PSI	112°F = 140.32PSI
66°F = 65.08PSI	80°F = 84.20PSI	94°F = 106.50PSI	116°F = 148.66PSI
68°F = 67.64PSI	82°F = 87.20PSI	96°F = 109.96PSI	120°F = 157.30PSI

R134a TEMPERATURE / PRESSURE CHART Unit will purge down to Vapor pressure plus 5psi.			
54°F = 50.05PSI	70°F = 74.10PSI	84°F = 93.50PSI	98°F = 120.02PSI
57°F = 53.68PSI	72°F = 74.10PSI	86°F = 97.02PSI	100°F = 117.00PSI
60°F = 57.40PSI	74°F = 77.10PSI	88°F = 100.66PSI	104°F = 124.52PSI
62°F = 60.04PSI	76°F = 80.22PSI	90°F = 104.30PSI	108°F = 141.74PSI
64°F = 62.68PSI	78°F = 83.46PSI	92°F = 108.14PSI	112°F = 151.14PSI
66°F = 65.42PSI	80°F = 86.70PSI	94°F = 111.98PSI	116°F = 160.94PSI
68°F = 68.26PSI	82°F = 90.10PSI	96°F = 115.94PSI	120°F = 171.10PSI

VACUUM MODE

During this cycle the Vacuum, Crossover, Suction Separator, and Vent solenoids are OPEN.The Compressor, Heater and Fans are also ON. The unit will pull a deep vacuum for the amount of time, up to 95 minutes, entered by the operator during programming setup. During this time both displays will show continuous vacuum (hg) measurements for the high and low sides.



VACUUM MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
VENT	S3	ON	N/C
OIL RETURN	S4	OFF	N/C
SUCTION SEPARATOR	S5	ON	N/C
VACUUM	S6	ON	N/C
CROSSOVER	S7	OFF	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECOVERY	S10	OFF	N/C
ZERO	S12	OFF	N/C
LIQUID	S13	OFF	N/C
PURGE	S14	ON	N/O
PUMP RELAY	K1	ON	N/O
FAN AND HEATER RELAY	K2	ON	N/O

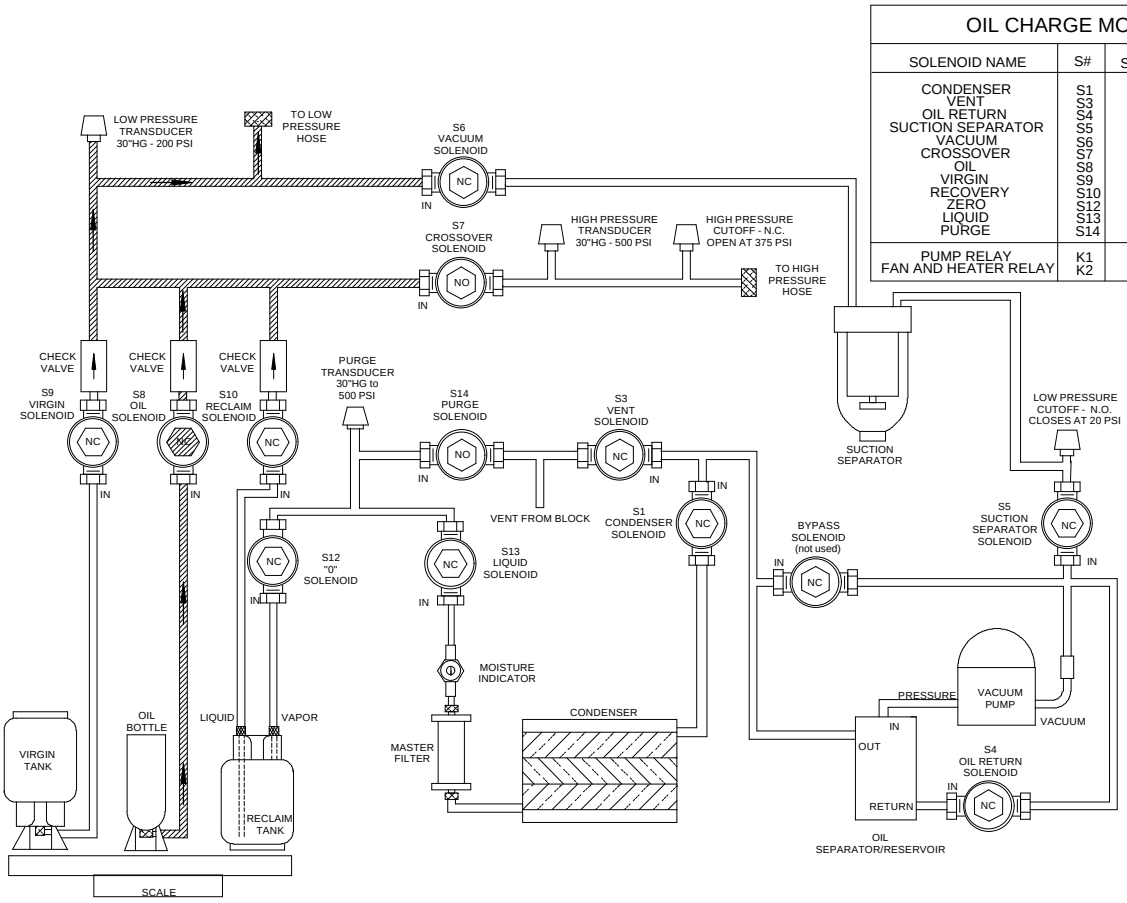
FIGURE 2-6 VACUUM MODE

VACUUM HOLD MODE

NO FIGURE SHOWN: After the Vacuum cycle, the MRC / ACT will hold and monitor the vacuum for a period of time, up to 95 minutes, entered by the operator during programming setup. The Vacuum and Crossover solenoids are CLOSED, while the compressor is OFF. Also the Heater and Fans are ON for the entire cycle. During this time the left display shows time remaining (in minutes) and the right display shows the continuous vacuum being held in the vehicle. This continues until the entered time has expired, or the vacuum drops out of tolerance level which is 2 inches of mercury. If the vacuum drops below the tolerance level, a beeper will alert the technician and the HOLD LED will turn ON. The vacuum loss indicates a leak in the vehicle or an incomplete reclaim (vacuum time was not set long enough to boil all of the residual refrigerant out of the vehicle). The technician can cancel the operation at this time and repair the system.

OIL CHARGE MODE

The Liquid solenoid is CLOSED, the Oil and Crossover solenoids are OPENED and oil from the Oil cylinder is dispensed into the system until the scale voltage indicates the correct weight has been dispensed. The amount of oil, entered into the unit by the operator, depends on the requirements of the vehicle being serviced. The dispensed oil is measured in fluid ounces and is indicated on the LCD display on the right.
The LCD display to the left displays the word "OIL". Oil will always be dispensed before refrigerant; if no refrigerant is programmed, oil will **NOT** be dispensed.



OIL CHARGE MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
VENT	S3	OFF	N/C
OIL RETURN	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSSOVER	S7	ON	N/O
OIL	S8	ON	N/C
VIRGIN	S9	OFF	N/C
RECOVERY	S10	OFF	N/C
ZERO	S12	OFF	N/C
LIQUID	S13	OFF	N/C
PURGE	S14	OFF	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-7 OIL CHARGE MODE

RECOVERED CHARGE MODE

In this cycle the Zero “0” solenoid is CLOSED and the Reclaim solenoids is OPEN. The Reclaim solenoid is open until the scale indicates to the LCD display that the correct amount (entered by the operator) of refrigerant is dispensed or until the Recovered Refrigerant Float Switch OPENS. When this happens unit will automatically switch over to dispense remaining amount of Virgin refrigerant through S9. The Reclaim solenoid will close and the Virgin solenoid will open until amount entered is charged.

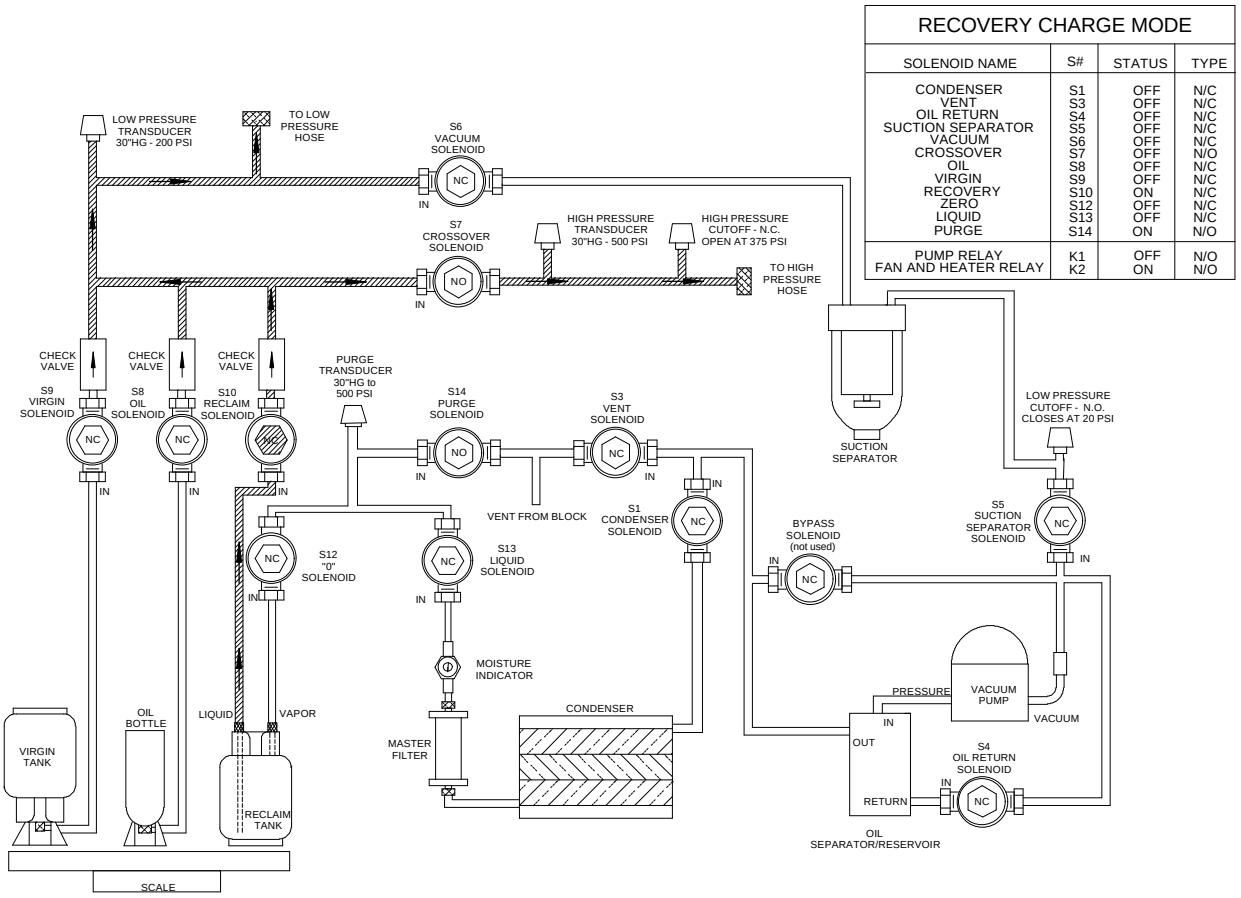
The Crossover Solenoid is temperature and pressure controlled, it should be OPEN when:

The discharge pressure is less than 80psi and Ambient temperature is greater than 64 degrees fahrenheit.

The Crossover Solenoid is CLOSED when:

The discharge pressure is greater than 90psi or Ambient temperature is less than 59 degrees fahrenheit

NOTE: *The above theory on the crossover solenoid is in reference to R-12; different refrigerants have different pressures.*



RECOVERY CHARGE MODE			
SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
VENT	S3	OFF	N/C
OIL RETURN	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSSOVER	S7	OFF	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECOVERY	S10	ON	N/C
ZERO	S12	OFF	N/C
LIQUID	S13	OFF	N/C
PURGE	S14	ON	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-8 RECOVERY TANK CHARGE MODE

VIRGIN CHARGE MODE

In this cycle the Liquid solenoid is CLOSED and the Virgin and Crossover solenoids are OPEN. The Virgin solenoid is open until the scale indicates the correct amount (entered by the operator) has been dispensed and the LCD display indicates that the charge has completed.

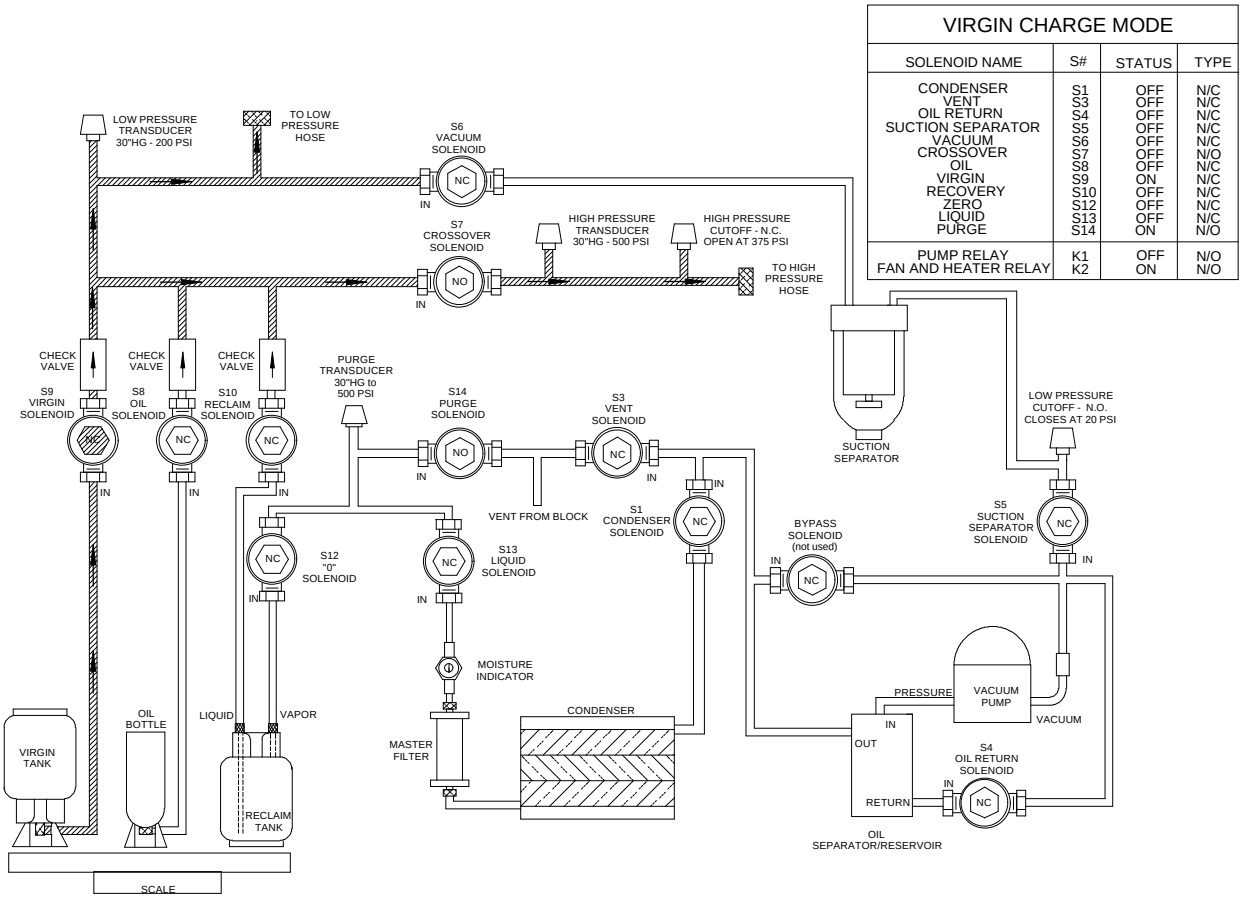
The Crossover Solenoid is temperature and pressure controlled, it should be OPEN when:

> *The discharge pressure is less than 80psi and Ambient temperature is greater than 64 degrees fahrenheit.*

The Crossover Solenoid is CLOSED when:

> *The discharge pressure is greater than 90psi or Ambient temperature is less than 59 degrees fahrenheit*

NOTE: *The above theory on the crossover solenoid is in reference to R-12; different refrigerants have different pressures.*



VIRGIN CHARGE MODE

SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	OFF	N/C
VENT	S3	OFF	N/C
OIL RETURN	S4	OFF	N/C
SUCTION SEPARATOR	S5	OFF	N/C
VACUUM	S6	OFF	N/C
CROSSOVER	S7	OFF	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	ON	N/C
RECOVERY	S10	OFF	N/C
ZERO	S12	OFF	N/C
LIQUID	S13	OFF	N/C
PURGE	S14	ON	N/O
PUMP RELAY	K1	OFF	N/O
FAN AND HEATER RELAY	K2	ON	N/O

FIGURE 2-9 VIRGIN CHARGE MODE

SUCTION SEPARATOR MODE

The Suction Separator cycle can be activated either by the Suction Separator Bowl filling with Oil or Refrigerant to the point where the Suction Separator Float Switch is activated or by pressing the red switch by the Suction Separator Bowl. In this cycle the Float switch in the Suction Separator Bowl will close and activate when raised. When this occurs the **MRC / ACT** will beep three times, display "SUC SEP" and the "HOLD" light on the front panel will be lit. The Suction Separator, Condenser, Liquid and Zero "0" solenoids will OPEN . The Fans, Heater and Compressor will be ON at this time. After a 5 minute deep Reclaim, the system will beep twice and the pressure on the Suction Separator Bowl will have been drawn to the Recovery Tank. The red switch near the Suction Separator Bowl will light.

With the Bowl removed and the Oil disposed of properly, the Suction Separator Float Switch can be reset by lifting and holding the Float Switch UP until the unit beeps twice and the red light near the Suction Separator Bowl will turn OFF. Releasing the float causes the unit to beep twice and turn the red light back on. With the Bowl replaced, press **<HOLD/ENTER/RESTART>** to reset and restart the unit. This will also turn OFF the red light near the Suction Separator Bowl.

BACKGROUND RECLAIM MODE

This cycle is triggered by a rise in pressure in the Suction Separator Bowl. Suction Separator light flashes. Unit enters Recovery mode with Vacuum solenoid ON, until Bowl pressure dissipates. Requires no operator intervention and could cause the operator to think this is an erratic operation

NOTE: *(Refer to appendix A of this manual for further details on updates and changes regarding this mode.)*.

SUCTION SEPARATOR OR BACKGROUND RECOVERY MODE

SOLENOID NAME	S#	STATUS	TYPE
CONDENSER	S1	ON	N/C
VENT	S3	OFF	N/C
OIL RETURN	S4	OFF	N/C
SUCTION SEPARATOR	S5	ON	N/C
VACUUM	S6	OFF	N/C
CROSSOVER	S7	OFF	N/O
OIL	S8	OFF	N/C
VIRGIN	S9	OFF	N/C
RECOVERY	S10	OFF	N/C
ZERO	S12	ON	N/C
LIQUID	S13	ON	N/C
PURGE	S14	ON	N/O
PUMP RELAY	K1	ON	N/O
FAN AND HEATER RELAY	K2	ON	N/O

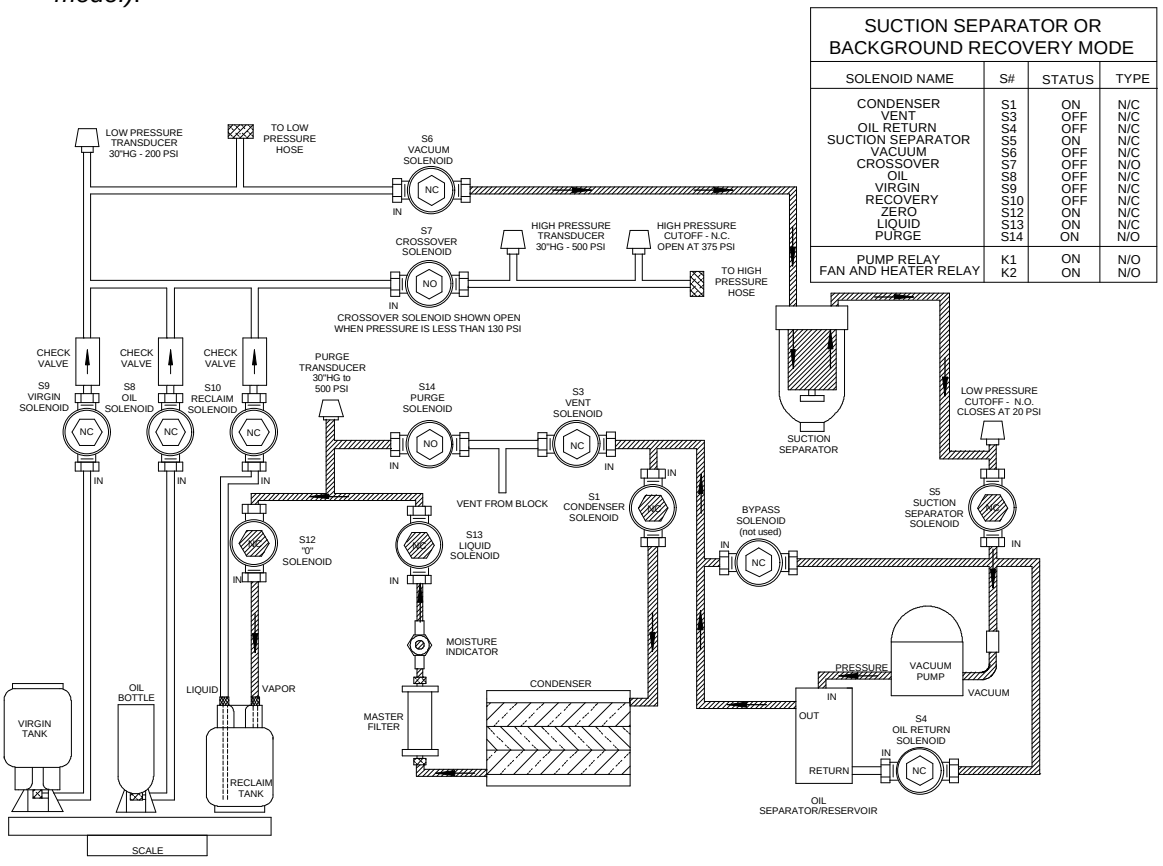


FIGURE 2-10 SUCTION SEPARATOR OR BACKGROUND MODE

TROUBLESHOOTING

	COMPLAINT	CORRECTIVE ACTION
I.	**Error Code 0. Internal CPU memory failure.**	Check for loose connections on wiring harnesses between PCB'S. Replace Processor CPU Board.
II.	**Error Code 1. Communication bus failure.**	Check for loose connections on wiring harnesses between PCB'S.
III.	**Error Code 2. Tank full.**	The Tank Full LED should be lit on front panel. If not check for proper connection of the reclaim tank float cord that attaches to the Reclaim Tank. Charge from the Reclaim Tank. Replace full Reclaim Tank with new prepped tank.
IV.	**Error Code 3. Software failure.**	Replace Processor CPU board. Or software I.C.
V.	**Error Code 4. Solenoid driver failure.**	Confirm solenoid driver failure by performing the Diagnostic Solenoid Test (Page 3-3). If test does not flag a certain solenoid, then; replace Plumbing Board. If Diagnostic solenoid test flags S9 (409), check High Pressure switch.
VI.	**Error Code 5. No pressure at Purge Transducer 30 seconds after the pump starts.**	Verify Pump is running. Check for leak on discharge side of pump between pump and purge solenoid. Check wiring to Purge Tranducer. Verify that the Purge Solenoid has voltage and is opening so the Purge transducer can sense pressure. Verfiy that the Bypass Solenoid is not stuck in the open position. Verfiy that the Temprite float inside the return port is not stuck open. This will cause a closed loop situation between the Temprite and the pump. (Temprite checkout procedure on page 3-7)
VII.	**Error Code 6. Pump failure.**	Check oil level in the Pump/Temprite. Confirm voltage from Pump Relay through Klixon Overload protector. If voltage is ok at pump winding then replace pump.

COMPLAINT		CORRECTIVE ACTION
VIII.	**Error Code 7. No weight drop from scalеduring refrigerant charge.**	• Start the vehicle. • If charging from the Virgin Tank, verify that the Heater blanket is ON. • Verify that the unit is recognizing a weight for the bottle that is being charged from by pressing **<AMOUNT>**. • Remove shipping bolts and check for debris blocking scale. • Verify that the valve and anti-blowback on the bottle that is being used are open. • Verify that the In-line filter on the bottle being used is not clogged with debris. • Verify that voltage is supplied to the Charge Solenoid for the bottle being used. • Verify that the Schrader valves on the vehicle are being fully depressed.
IX.	**Error Code 8. No weight dropdurring Oil charge.**	• Verify that the unit is recognizing the weight of the Oil cylinder by pressing **<AMOUNT>**. If weight reading is zero but oil is present, reset Oil cylinder bracket on scale and wait for 2 beeps. • If Oil cylinder is empty, replace with new cylinder. • Verify that the oil charge solenoid is getting voltage. • Verify that the oil charge solenoid is physically working and there is no debris in it that might restrict flow. • When charging oil, the operator must have a refrigerant amount already programmed in the **<Auto Sequence>** mode or the unit will not have the option to charge oil.
X.	**Error Code 9. Weight amount stored in memory does not agree with weight presently on scale.**	• Remove everything from scale. Turn rear Power switch OFF. Wait a few seconds and power up unit. Then reinstall everything on scale, making sure to hear two beeps after each item on scale is replaced. Check by pressing **<AMOUNT>**.
XI.	**Error Code 10. Present Scale weight less than 2 lbs.**	• Perform Scale calibration on page 3-2 of this manual. • Replace load cell. • If load is more then 155, reduce weight.
XII.	**Error Code 11. Present Scale weight is greater than 155 LBS.**	• Perform Scale Calibration on page 3-5 of this manual. • Replace load cell.

COMPLAINT	CORRECTIVE ACTION
XIII. Error Code 12. Tank Full and Tank Empty lights are on at the same time.	• Verify that the Reclaim Tank Float Cord is connected properly. • Verify proper operation of float cord by ohming out the pins on the cord. • Possible float inside tank is sticking. Reclaim and evacuate tank. Turn tank upside down and confirm both lights are on. Remove float assemble from tank and repair. • Replace tank.
XIV. Error Code 13. Present High side pressure is less than 30 HG.	• Check 1/4 amp fuse. • Perform Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-2 of this manual. Replace if necessary. • Replace PLumbing board.
XV. Error Code 14. Present High side pressure is greater than 200 PSI.	• Perform Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-2 of this manual. Replace if necessary. • Replace PLumbing board.
XVI. Error Code 15. Present Low side pressure is less than 30 HG.	• Perform Zero Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-2 of this manual. Replace if necessary. • Replace PLumbing board.
XVII. Error Code 16. Present Low side pressure is greater than 200 PSI.	• Perform Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-2 of this manual. Replace if necessary. • Replace Plumbing board.
XVIII. Error Code 17. Present Purge pressure is less than 30 HG.	• Perform Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-2 of this manual. Replace if necessary. • Replace Plumbing board.

COMPLAINT	CORRECTIVE ACTION
XIX. Error Code 18. Present Purge pressure is greater than 500 PSI.	• Perform Transducer Calibration on page 3-6 of this manual. • Verify proper voltage versus pressure of the High Pressure Transducer on page 3-2 of this manual. Replace if necessary. • Replace Plumbing board.
XX. Error Code 19. No Reclaim tank present.	• Verify that Reclaim tank is depressing switch and being recognized by unit. Press **<AMOUNT>**. • Check appendix A,(A-1) For Dip switch configuration #4. • Remove and replace Reclaim tank making sure to wait for 2 beeps. • Verify wiring and operation is correct on the switch behind the reclaim tank on the scale (Center tab not used). • Verify wiring connection on the load Cell of the scale and also where the Load Cell connects to the Plumbing board. Replace Load Cell if necessary. Replace Plumbing board if necessary.
XXI. Error Code 20. No vacuum in new Reclaim tank.	• When installing a new Reclaim tank, it first must be prepped by pulling a 15 minute vacuum on it. • Pull a 15-minute vacuum on your service bottle and attach the units red and blue Reclaim tank hoses to the vacuumed service bottle. Install customers Reclaim tank and wait for 2 beeps. Disconnect hoses from the service bottle and reconnect to customers tank.
XXII. Error Code 21. No vacuum in hold after evacution.	• Disconnect the unit from the vehicle and pull a vacuum on the unit with the charge hose hand valves CLOSED to verify the unit is not leaking. Repair leaks if necessary. If unit holds fine, then automobile system is leaking. • Verify that Charge solenoids are not leaking refrigerant into the units system. In the Power On Mode with no functions engaged with the charge hose hand valves CLOSED, see if pressure rises on the Low side LCD on its own. If pressure rises, repair leaking solenoid. • Verify that operator has pulled a minimum of 30 minutes of vacuum on the vehicle being serviced. This will ensure that no residual refrigerant is left in the vehicle system that could cause a rise in pressure.

COMPLAINT	CORRECTIVE ACTION
XXIII. Error Code 22. Vacuum loss greater than 2"HG in Hold.	• Press **<Cancel>** to verify that the vacuum has actually dropped more than 2 HG. If not, Unplug heater blanket and try again. (See Service Bulletin 713 for noise effecting transducer). • Close vehicle adapters or inline Ball valves and disconnect hoses from vehicle. Recover any pressure, and program unit for 5 min. Vacuum and 5 min. Hold. If unit passes test, the problem is in the vehicle or vehicle adapters. (To test R-134a vehicle adapters use service coupler 7009-2492-01) • Close virgin valve. If display indicates pressure, recover it. Once completed monitor the displays for around 4 to 5 minutes. If displays increase in pressure, problem is in the recovery tank charge solenoid. Repeat test open virgin valve and close the blue recovery tank valve. Replace or rebuild manifold block.
XXIV. Error Code 23. Present ambient temperature is less than 32 Deg. F.	• Verify the temperature is within operating specs. The units operating temperature range is 50º F to 120º F. • Press **<Power>** and **<Up>** at the same time. Then press the **<Up>** key. The right LCD will show ambient temperature. Verify that it is within operating specs and matches the correct ambient temperature of the day. If it does not match the temperature of the day, replace ambient temperature sensor on recovery tank strap. On early models without temperature sensor on strap, replace Plumbing board.
XXV. Error Code 24. Present ambient temperture is greater than 150 F.	• Turn power off and let cool. • Disconnect temperature probe and try again. • If temperature sensor is OK, this error code can arbitrarily come up when the Mux A/D is confused. Check connections to and from scale. Shorted load cell.
XXVI. Error Code 25. Discharge temperature less than 20 F.	• Connect temperature probe or replace probe unless probe is really that cold, or probe is not connected.
XXVII. Error Code 26. Discharge temperature greater than 150 F.	• Replace temperature probe or cool probe.
XXVIII. Error Code 27. Incorrect refrigerant switch settings.	• See setup instructions or Appendix A-1.
XXIX. Error Code 28. High pressure switch on.	• Reduce high pressure. Activates at 375 PSI. Turn A/C off. • Check switch for continuity.

COMPLAINT	CORRECTIVE ACTION
XXX. Error Code 29. No refrigerant tanks charging.	• Install a R-12 tank, or confirm straps are tight against switch. • Check wiring to switch on rear of scale. • If switch is ok check Plumbing board.
XXXI. Error Code 30. No oil tank available for charging.	• Install cylinder and bracket as one piece.

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FRONT PANEL KEYPAD

POWER DOWN UP
TEMP AMOUNT CANCEL
RECLAIM AUTO S. H/E/R

J9
6 ACT 3
3 SENSE 3
5 ACT 2
2 SENSE 2
4 ACT 1
1 SENSE 1
7 SHEILD
1M

CONTROLLER

I/O PORT

J4
3 4 1 2 7 8
BRIDGE RECTIFIERS & REGULATORS

REFER TO AC/DC IN CHAPTER 1

PROCESSOR BD. 7001-2188-02

J2
2 OSC1
1 OSC2
3 CLOCK
4 DATA

J1 (LCD BD. 7001-2153-01 (LEFT))
1 2 3 4
DRIVER
LCD

LCD BD. 7001-2153-01 (LEFT)

J5
1 CLOCK
2 DATA

J1 (LED BOARD)
3 CLOCK
5 DATA

LED CON-TROLLER
LED DRIVER

J1
1 BEEP*
ALARM

+12VDC
D1-D15
LED*

LED BOARD 7001-2159-01

J8
1 OSC2
2 OSC1
3 CLOCK
4 DATA

J1 (LCD BD. 7001-2153-01 (RIGHT))
1 2 3 4
DRIVER
U1 LCD DRIVER

LCD BD. 7001-2153-01 (RIGHT)

DATA IN
DATA OUT
CLOCK
J6 4 3 2

CLOCK
DATA
INT
J3 4 5 6

REFER TO AC/DC IN CHAPTER 1

K1 K2
D1 D2
J1 1 2 3
RELAY BD. 7001-2230-01

FAN*/HEATER*
PUMP*
J12 3 2 1
+24 VDC

J8 4 3 2
J5 4 5 6

A/D
HPT LPT PPT LC EXT INT

I/O PORT

J11
HPT D7 WHT 2, GRN 3
LPT D6 WHT 7, GRN 8
PPT D5 WHT 12, GRN 13

HIGH PRESSURE TRANSDUCER
LOW PRESSURE TRANSDUCER
PURGE PRESSURE TRANSDUCER

S1-S6, S8-S13 NORMALLY CLOSED
S7& S14 NORMALLY OPEN
S2 & S11 NOT USED

HIGH PRESSURE SWITCH
NORMALLY CLOSED
OPENS AT 450 psi
CLOSES AT 375 psi

J2
9 >20 PSI* / <10 PSI
8
7 >12 oz.* / <12 oz.
6
11 MAINTENANCE*
12
13
10 NOT FULL*/ FULL
1
2 EMPTY* / NOT EMPTY
5
4

SS PRESSURE SWITCH
SS FLOAT SWITCH
LAMP +5 VOLTS
SUCTION SEPARATOR SERVICE SWITCH
RECOVERY TANK NOT FULL*
RECOVERY TANK EMPTY

J3
1 INSTALLED* / NOT INSTALLED
2
5 INSTALLED* / NOT INSTALLED
6
7 INSTALLED* / NOT INSTALLED
9

OIL ON
VIRGIN ON
RECOVERY ON

1 2 3 4
RECOVERY TANK

J7
S9 VIRGIN 1
S10 RECOVERY 2
S13 LIQUID 7
S12 ZERO 10
S8 OIL 12
S7 X-OVER 3
S6 VACUUM 4
S5 SS 5
S1 CONDENSOR 8
S4 OIL RETURN/BYPASS 6
S14 PURGE 9
S3 VENT 11
GND 17
GND 16
GND 18
N/U 19
GND 14

SMART DRIVERS WITH SELF TEST
OUTPUT PORT
INPUT PORT

HIGH PRESS. SW. <350 PSI* / >450 PSI
EXTERNAL TEMPERATURE PROBE
SIGNAL OUT
J9 2 EXT

+5V
Q2
K1

J10
1 RED
LC VR2 +10V VR1
4 WHT
INT 2 GRN SIGNAL OUT

LOAD CELL

AMBIENT TEMPERATURE SENSOR

PLUMBING BD. 7001-2266-01

SS PRESSURE SWITCH
NORMALLY OPEN
CLOSES AT 20 psi
OPENS AT 10 psi

SS FLOAT SWITCH
NORMALLY OPEN
CLOSES AT 10oz. OF OIL

SS SERVICE SWITCH
NORMALLY OPEN
CLOSES WHEN DEPRESSED

RECOVERY TANK
UPPER FLOAT
NORMALLY CLOSED
OPENS WHEN TANK IS FULL

LOWER FLOAT
NORMALLY OPEN
CLOSES AROUND 6 lbs. OF REFRIGERANT

OIL SWITCH
NORMALLY OPEN
CLOSES WHEN TANK IS INSTALLED

VIRGIN SWITCH
NORMALLY OPEN
CLOSES WHEN TANK IS INSTALLED

RECOVERY SWITCH
NORMALLY OPEN
CLOSES WHEN TANK IS INSTALLED

SUN ELECTRIC CORPORATION
One Sun Parkway
Crystal Lake, Illinois 60014 U.S.A.

MODEL: MRC-400/450	DWG REV: 0695 REV A.
DWG BY: T. WILSON	CHK BY: ZOFINSKI / T. WILSON

TITLE:
SERIAL "B" FUNCTION BLOCK DIAGRAM

DWG:	PAGE:
2-1	2-19/20

CHAPTER 3
CHECKOUT-CALIBRATION-MAINTENANCE PROCEDURES

CHECKOUT PROCEDURES

⚠ WARNING!

USE STANDARD REFRIGERANT HANDLING
SAFETY PROCEDURES WHEN PERFORMING INSTALLATION

ALWAYS WEAR SAFETY GOGGLES, DON'T SPILL OR TOUCH
LIQUID REFRIGERANT, AVOID FLAMES, AND EXCESSIVE HEAT.
USE ONLY IN WELL VENTILATED AREA.

SYSTEM TEST PROCEDURE:

NOTE: ***THIS PROCEDURE WILL CHECK OUT THE MAJORITY OF THE UNIT WITHOUT THE REQUIREMENT FOR HOOK UP TO A VEHICLE.***

Shut down unit by turning front panel ON/OFF button OFF.

Turn off Recovery tank valves and remove Vapor hose from RECOVERY tank.

Connect vapor hose to Red vehicle High side hose. High side will display pressure. (MRC-450 uses yellow utility hose)

With Low side hose connected open hand valve. (MRC-450, remove Low side vehicle adapter).

Turn unit on and program unit to "RECLAIM ONLY".

Low side will display vacuum until it reaches about 4” or 5", where the pump will shut off. If pump turns on and off when appropriate, then transducers are correctly adjusted and unit is operating correctly.

When pump restarts plug low side hose with your thumb to seal system and create a Vacuum.

NOTE: *If high side does not increase it will most likely be a restriction, troubleshoot per unit purging.*

TEST COMPLETE

PUMP CHECKOUT PROCEDURE

To start and run properly, the vacuum pump requires a properly grounded 115VAC voltage supply with sufficient current carrying capacity. If possible, avoid extension cords. However, if you must use one, it must be at least 18 AWG and not over 10 feet long.
To confirm operation:

Turn on unit and confirm hand valves are closed.

Press Auto sequence.

Enter time for vacuum only and activate by continuing to press the **<HOLD/ENTER/RESTART>**

Pump will start and displays will show amount of vacuum in "hg".

Cancel operation once pump is confirmed operating.

If the pump doesn't start, ensure that the above requirements are confirmed; then see Troubleshooting in Chapter 2.

TEST COMPLETE

CHECKOUT CHARGE AND RECLAIM PLUMBING

Close both hand valves at the end of the hoses.

Turn on the unit and in the Auto sequence, program 4 ounces (0 LB's 4 oz.) of refrigerant. Wait and watch the displays; the unit should hold the pressure. If not, use leak detector to find leak.

Press **<RECLAIM>**; allow unit to operate.

Wait and watch the displays; the unit should decrease the pressure until 4-6 inches is displayed. If it looses vacuum check reclaim hose fittings.

CHECKOUT COMPLETE

TRANSDUCER CHECKOUT PROCEDURE

TOOLS REQUIRED: DVM

Transducers output a voltage proportional to amount of pressure they sense. The suction side transducer outputs .00025 (.25 millivolts) per psi and the discharge and purge transducers output .0001 (.1millivolt) per psi. At atmosphere, zero pressure, the transducers output voltage is .5 volts D.C. This amplified voltage can be measured at the cathode of diodes on the plumbing board. (Diodes are located in upper right corner of Plumbing board when installed in unit) To confirm transducers are functioning properly follow procedure below to measure .5 volts.

(PROCEDURE BELOW USES EXAMPLE ON LOW PRESSURE TRANSDUCER)

Reclaim any pressure on hoses. Open hand valves or disconnect hoses from rear of unit.

Connect DVM red lead to cathode of diode.
(D5 = Purge transducer / D6 = Low transducer D7 = High transducer)

Connect DVM black lead to SP3, (Top Center)

DVM should read .550 volts D.C. plus or minus .05 volts. If not change transducer. (May vary with altitude.)

With 70 psi on displays: (D5 = 1.102 volts / D6 = 2.349 volts / D7 = 1.238 volts).
NOTE: *DIODE D5 VOLTAGE MAY BE DIFFERENT DUE TO AMOUNT OF AIR IN SYSTEM.*

CHECKOUT COMPLETE

SERVICE SUB PAGE, (Raw Scale Weight, Purge Pressure & Temperature).

Press the <UP> arrow and the <POWER> at the same time.

This will display entire scale weight readings live. Press <UP> to toggle between Purge pressure and temperature.

Press <DOWN> to exit.

TANK INSTALLATION (ERROR CODE 9)

Remove all tanks from scale with Power on (Including Oil bracket). Turn off unit from rear panel switch.

Wait 10 seconds and turn on rear panel power switch. Turn on front panel power switch.

Wait for 2 beeps. (Indicating stable scale reading) Carefully install Reclaim tank. Wait for 2 beeps.

Carefully install Virgin tank. Wait for 2 beeps. Carefully install Oil cylinder with bracket. Wait for 2 beeps.

To confirm press **<AMOUNT>** for each tank. Correct amount for each tank should be displayed.

CHECKOUT COMPLETE

R134a VEHICLE ADAPTERS CHECKOUT PROCEDURE

TOOLS REQUIRED: R134a Service Coupler used to test vehicle adapters P/N 7009-2492-01

1. Connect vehicle adapters to block and open valves.
2. Program 5 minutes of Vacuum and Hold.
3. Do they leak? If so repair leak or replace adapter.

CHECKOUT COMPLETE

SERVICE SUB PAGE, (Raw Scale Weight, Purge Pressure & Temperature).

1. Press the **<UP>** arrow and the **<POWER>** at the same time.
2. This will display entire scale weight readings live. Press **<UP>** to toggle between Purge pressure and temperature.
3. Press **<DOWN>** to exit.

SOLENOID DIAGNOSTICS (ELECTRIC)

PREREQUISITIES:

The MRC-400/450 has built in diagnostics to test the electrical portion of the unit. Each solenoid is controlled by a "SMART DRIVER". These drivers can detect an open or a short. When self diagnostics is performed and a solenoid is defective the number representing that device will be displayed following the number 4. **EXAMPLE:** Err. 405, the 5 represents solenoid S5, the 4 represents an electric problem with the block. Below a list of solenoid descriptions.

DIAGNOSTIC SOLENOID TEST; TO ACTIVATE W/POWER ON:

NOTE: ***ON POWER UP, IF ERROR 4XX APPEARS; ACTIVATE TEST W/FRONT PANEL POWER OFF***

1. Press **<DOWN ARROW>** and **<POWER>** at the same time, "self diag" is displayed and test is in process.
2. Once completed, "ELEC PASS", "PASS PASS" or failure code will be displayed. If solenoid is shorted, on power up ERR-4 will be displayed. Perform same test with front panel power off to find solenoid.

SOLENOID DESIGNATION / ERROR CODES

SOLENOID VALVES	DESCRIPTION		ERROR CODES	DESCRIPTION
401. Condenser	S1		ERROR 174	LCD Driver
403. Vent	S3		ERROR 140	Upper Led Driver
404. Oil Return	S4		ERROR 142	Lower Led Driver
405. Suction Sep.	S5		ERROR146	Plumbing board
406. Vacuum	S6		ERROR 148	Plumbing board
407. Crossover	S7		ERROR 14A, C, E, 1A2	Plumbing board
408. Oil	S8		ERROR 4110	Plumbing board failed, U-10
409. Virgin	S9		ERROR 4115	Plumbing board failed, U-15
410. Recovery	S10			
412. Zero	S12			
413. Liquid	S13			
414. Purge	S14			

CHECKOUT COMPLETE

FLOW TEST DIAGNOSTICS (ELECTRIC)

PREREQUISITES: Both tanks must have refrigerant.

Flow test (Displayed: "Flow resr", t looks like r, due to segments on displays) was designed to enable testing of pneumatics. With the hand valves closed a small amount of refrigerant is allowed to escape from both tanks and reclaimed by the unit.
This slug of refrigerant goes through the Vacuum solenoid into the Suction Separator bowl, vapor and is reclaimed by the pump. The vacuum pump sucks the vapor through the system into the condenser where it returns to a liquid and flows into the Reclaim tank. As this function flows the transducers monitor the process, if pressures are not read or are stopped by a restriction the test will fail and an error code exhibited.

FLOW TEST:

1. Open both tanks with refrigerant and close hand valves. (ACT-4500/MRC-450, not connected to vehicle)
2. Press the **<UP ARROW>** while "ELEC PASS" is displayed once Self Test has completed W/power on. (SEE APPENDIX "F" FOR ERROR CODES) **CAUTION:** DO **NOT** PRESS DOWN ARROW THIS WILL ENTER A MANUFACTURES SUB TEST TO OPEN ALL SOLENOIDS, WITH SOFTWARE 1.10 OR UNDER.FLOW TEST THEORY OF OPERATION WITH ERROR CODES:
3. Unit looks at Virgin tank switch, if tank is present OK. If not **NO VIR 1** is displayed.
4. Unit looks at Oil switch, if oil cylinder is present OK. If not, **NO OIL 2** is displayed.
5. Unit looks at Reclaim tank switch to see if tank is present. If not, **NO RECLM 3** is displayed.
6. Unit runs reclaim to ensure system is capped off.
7. Suction Separator switch is monitored with vacuum solenoid opened during Reclaim. Switch should not close. If it does, **511** is displayed.
8. Unit looks at Reclaim tank switch to see if tank is present. If not, **500** is displayed.
9. Unit looks at Virgin tank switch to see if tank is present. If not, **50**1 will be displayed.
10. As test procedure continues, pump is started and the Vacuum and Suction Separator solenoids are powered/opened. Test is timed. If vacuum does not increase to 15" within 7 minutes, then vacuum pump did not move gas through system and **502** will be displayed.

NOTE: ***IF RECLAIM EMPTY LIGHT IS ON THIS WILL FAIL DUE INSUFFICIENT REFRIGERANT AMOUNT***

11. As pump vacuums system the Low and High transducers react producing low voltages; the unit expects these changes. If Low pressure transducer does not react **503** is displayed. Or if High pressure transducer does not react, **504** is displayed.
12. Next voltage is applied to Virgin solenoid S9. The solenoid is opened for a moment allowing the Low pressure transducer to sense 30 psi or greater. If no pressure is sensed, **505** is displayed.
13. Voltage is applied to Reclaim solenoid S10. The solenoid is opened for a moment allowing the Low pressure transducer to sense 30 psi or greater. If no pressure is sensed, 506 is displayed.
14. Voltage is applied to Oil solenoid S8. The solenoid is open for a moment allowing the low pressure transducer to sense an increase. If no pressure is sensed, **507** is displayed.
15. While this pressure is present the Crossover solenoid S7 is closed and more pressure is released. The pressure on the Low and High transducers are compared. The Low pressure transducer should be 30 psi higher. If not, **508** will be displayed.
16. Now the Crossover solenoid S7 is opened. High pressure transducer is expecting pressure to increase. If no rise in pressure is attained, **509** will be displayed
17. Vacuum solenoid S6 is opened. Low pressure switch will sense more than 20 psi. If not, unit displays **510**.

FLOW TEST DIAGNOSTIC continued...

18. Suction Separator solenoid is opened. Low pressure switch should closed and the pressure drops. If not, **512** is displayed.
19. Refrigerant is vacuumed in through the pump and pushed out under pressure. Bypass solenoid is opened and pressure should decrease. If not, **513** is displayed.
20. Condenser solenoid is opened, purge transducer pressure should increase. If not **514** is displayed.
21. As refrigerant continues through Liquid solenoid pressure is monitored, if No increase is sensed when Liquid solenoid was opened, **516** is displayed.
22. System is pressurized, and the Vent solenoid is opened, expecting a drop, no drop and **517** is displayed.
23. While the Purge solenoid is opened, pressure transducer voltage is being monitored for zero pressure, if it doesn't correspond **518** is displayed.
24. When the Zero solenoid is open we expect an increase from the tank, if it doesn't increase **519** is displayed.

FLOW TEST COMPLETE

CALIBRATION PROCEDURES

SCALE CALIBRATION

TOOLS REQUIRED: 50 LB's OF WEIGHTS IN QUANTITIES OF 10 LB.

NOTE: ***ONCE IN SERVICE PAGE, TO EXIT, PRESS <DOWN> .***

1. Shutoff the valves on the tanks and remove everything from of the scale, including the oil bracket.
2. Press up-arrow and power buttons at the same time to access "Raw scale weight". Left display shows pounds; right display shows ounces.

NOTE: ***PRESS UP-ARROW TO TOGGLE BETWEEN RAW SCALE WEIGHT & PURGE TRANSDUCER PRESSURE.***

3. Place 10 lb. weight on scale, adjust VR1 on the Plumbing board (7001-2185-01) for 10.30 lb. on left display. (positive readings could be affected if zero should drift negative, so we added 3 to 12 oz. to compensate, offset can be as high as 12 oz. confirm linearity by adding 10 pounds before adjusting)
4. Add remaining 40 lb. weight on scale, adjust VR2 on the Plumbing board for 50.30 LB on left display. Repeat steps 3 and 4 until unit displays correct reading on both steps with out any adjusting. Remove weights.
5. Press **<DOWN>** to exit.
6. Reinstall tanks, wait for two beeps each time tank is installed.
7. Screw oil bracket and cylinder in place, wait for 2 beeps.

CALIBRATION COMPLETE

TEMPERATURE PROBE CALIBRATION

Calibration is done through software, this software adjustment compensates for the added resistance of the cable compared to the ambient temperature sensor in the unit. This calibration is performed during the unit calibration. This also zero's the Low and High transducers.

CALIBRATION COMPLETE

TRANSDUCER CALIBRATION

NOTE: UNIT CAN NOT ENTER CALIBRATION IF TRANSDUCERS SENSE PRESSURE. If Transducers have drifted into PSI, program Vacuum to bring reading down into VACUUM.

1. Turn unit on, if displays indicate a pressure press **<RECLAIM>**.
2. When completed open the hand valves (Allows transducers to be at atmospheric pressure). On R134a units remove hoses from rear ports.
3. Press and hold **<HOLD/ENTER/RESTART>** for five seconds, "CAL" should be on both displays.
4. Press **<RECLAIM>**, observe that the "IN PROGRESS" LED is flashing and the "HOLD" LED is on. To activate test press the **<HOLD/ENTER/RESTART> .**

NOTE: IF UNIT HAS ANY PRESSURE IN SYSTEM IT WILL RECOVER THE PRESSURE AND THEN ENTER 3 MINUTE DELAY.

1. Temperature will be displayed. Adjust the reading by pressing the <UP> or <DOWN> keys untill the display matches the readings on the thermometer. NOTE: The display shows whole numbers only but the accuracy of the sensor is .4 degrees. You may have to press <UP> or <DOWN> 2 or 3 times to get the temperature reading to change 1 degree. Select the temperature that most closely matches the thermometer and press **<ENTER>.**
2. The "COMPLETED" LED will be on and displays will show "O PSI".
3. Remove thermometer, tighten velcro strap around Recovery tank and store vehicle temperature probe. Close hand valves or reconnect to unit.

CALIBRATION COMPLETE

CUSTOMER CAL OR QUICK CAL (TRANSDUCERS ONLY)

NOTE: UNIT MUST HAVE ATLEAST 2.21 SOFTWARE.

1. Turn on unit and wait 3 minutes for stabilization. If unit displays pressure press **<RECLAIM ONLY>.**
2. When completed open the hand valves (Allows transducers to be at atmospheric pressure, zero). On R134a units remove hoses from rear ports.
3. Press and hold **<HOLD/ENTER/RESTART>** for five seconds or until "CAL" is displayed.
4. In 5 seconds the displays will indicate 0.

CALIBRATION COMPLETE

MAINTENANCE PROCEDURES

TEMPRITE/OIL RESERVOIR CHECKOUT PROCEDURE

Tools Required: Dip Stick (Make out of coat hanger wire) / OIL PART NUMBER: 0681-0179-02

1. Reclaim any pressure in hoses; once completed remove the output hose from temprite.
2. Insert dip stick and confirm oil level quantity. (2.5 inches / 13 ounces)
3. Program 5 minutes of vacuum, while pump is running confirm air pressure is escaping from Out port of Tempright. If not change temprite.

NOTE: ***IF OIL LEVEL IS EXTREMELY LOW CHECK FOR EXCESS OIL IN PUMP,***

CHECKOUT COMPLETE

PROCEDURE FOR CHANGING OIL / OIL SHOULD BE CHANGED EVERY 90 DAYS

OIL RESERVOIR MAINTENANCE

This procedure is in reference to the large Temprite oil reservoir. The small reservoir does not require oil maintenance since it does not contain any oil. The oil level in the reservoir should be checked whenever a failure such as a leak in the plumbing, excessive purging occurs or compressor is whining.

NOTE: ***Release pressure in the system by entering the S. S. mode; activate by pressing the red switch by the suction separator bowl.***

1. Place the Power Switch in the "ON" position.
2. Close the hand valves at the end of both service hoses.
3. Press **<RECLAIM ONLY>**.
4. When the green status LED lights, turn POWER OFF. Unplug the MRC from the grounded 110 volt outlet.
5. Remove the two screws under the front lip of the control panel. Lift up the control panel.

⚠ WARNING!

USE STANDARD REFRIGERANT HANDLING
SAFETY PROCEDURES WHEN PERFORMING INSTALLATION

ALWAYS WEAR SAFETY GOGGLES, DON'T SPILL OR TOUCH
LIQUID REFRIGERANT, AVOID FLAMES, AND EXCESSIVE HEAT.
USE ONLY IN WELL VENTILATED AREA.

6. Remove the three (3) hoses attached to the pump oil reservoir.
7. Remove the nut that secures the oil reservoir to the bottom of the shelf and remove oil reservoir.
8. Invert the reservoir and empty the oil via the "OUTPUT" fitting into an approved container in accordance with Local, State and Federal regulations that may apply in your area.
9. Disconnect hoses to compressor. Remove four bolts securing pump to unit.
10. Tip and pour oil out of compressor. Refill with 10 ounces of new oil.
11. Using a small funnel, pour 13 oz. of recommended compressor oil into the outlet port of the reservoir. 13 oz. of oil will measure 2-1/2" on the dip stick.
12. Carefully reinstall the oil reservoir and pump onto the shelf in the cabinet. Secure with the hardware previously removed.
13. Reconnect the yellow hose to the "OIL" port, red hose from compressor to "INLET" port and red hose from pneumatic block to "OUTLET" port.
14. Lower control panel and reconnect the two screws removed in step 5.

CALIBRATION COMPLETE

PUMP MAINTENANCE

CHANGING OIL USING A VACUUM SOURCE TO DRAW OUT THE OIL.

OVERVIEW: _____

Many technicians have inquired about a quicker way of changing the oil in the compressors in our Air Conditioning Recyclers. Below is a procedure which some of our technicians have already been using and have confirmed works. We are using as many parts at hand as possible, (Example: Suction Separator Bowl and R-12 hose with finger tight fittings #3988-0243-01).

NOTE: ***First, F.Y.I. we cannot add a oil drain plug because the bottom thickness of the pump is too thin, we would have to weld an additional piece of metal to the bottom and then make the drain. This added cost is not feasible.***

PARTS LIST: _____

- Hoses: 2 Hoses with finger tight fittings. (8' hose 3988-0243-01 to be connected to vacuum source), (18" yellow hose 3988-0246-01 to be used w/catheter tube)
- Vacuum Pump: Any vacuum pump is acceptable.
- Optional: Tiny firm tube, which would fit into the fitting on the pump. (Example: Catheter tube, 14 inches) Insert catheter tube into hose with finger tight fitting prior to the start.

Removing oil using an optional catheter tube.

1. If there is any refrigerant or oil in the Suction Separator bowl, perform bowl maintenance, bowl must be empty. Remove desiccant bag and discard for this procedure.
2. Turn off the unit and unplug the cord from the wall outlet.
3. Remove the two bolts under the front lip of the tester and open the top.
4. Disconnect the two hoses/tubes from the Suction Separator bowl.
5. Attach one end of a 8' hose to the left side (inlet) of the suction separator bowl. The other end to the vacuum source. See figure 1 on the next page.
6. Connect the hose with catheter tube to the right side (outlet) of the Suction Separator bowl. Remove top hose from compressor.
7. Turn on vacuum source, and insert the catheter tube inside the compressor. As soon as it reaches the oil, the tube will fill, causing the oil to be collected in the suction separator bowl.

NOTE: ***Monitor Suction Separator bowl so it doesn't over flow. Pumps make a lot of noise when they are over filled.***

8. If oil stops, continue to push the catheter tube down into compressor, perform this step a few times until compressor is empty. *This may take some practice and patience.*
9. Shutoff the vacuum source, and remove the catheter tube.
10. Remove the bowl and discard the oil properly.
11. Remove the hoses connected in steps 4 & 5 and connect to original position.
12. Continue to filling compressor with oil.

PROCEDURE COMPLETE

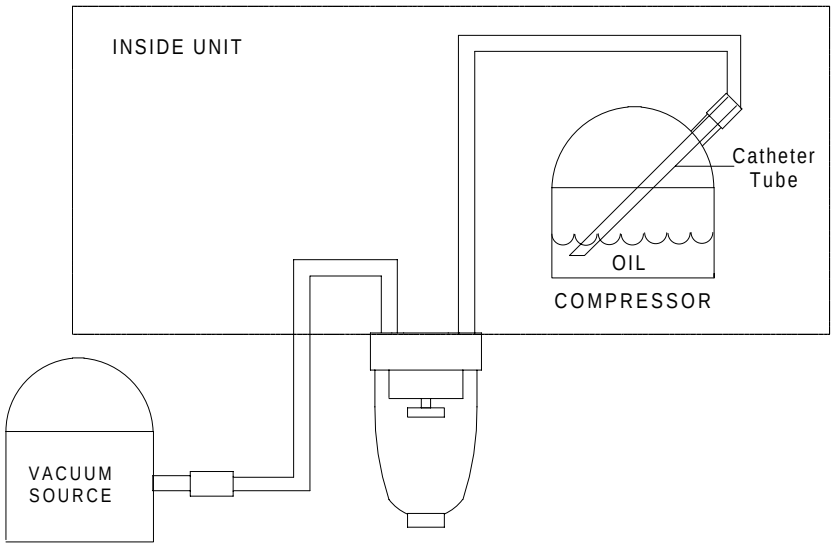


Figure - 1

Removing oil without catheter tube:

1. If there is any refrigerant or oil in the Suction Separator bowl, perform maintenance, bowl must be empty. Remove desiccant bag for this procedure.
2. Turn off the unit and unplug the cord from the wall outlet.
3. Remove the two bolts under the front lip of the tester and open the top.
4. Disconnect the two hoses/tubes from the Suction Separator bowl.
5. Access the compressor. Remove top hose from compressor.
6. Attach hose to top fitting on pump. This will require hose with finger type fitting. Attach other end to right side of suction separator bowl. The bowl catches the oil.
7. Unbolt the pump and turn upside down, the other hose may have to be removed. This will bring the oil to the fitting.
8. Attach one end of a 8' hose to the left side the suction separator bowl.
9. Connect the other end to vacuum source.
10. Turn on vacuum source, and a vacuum will be applied thru the hoses and bowl to the pump, causing the oil to be collected in the suction separator bowl.
11. After a few moments all the oil will be in the bowl. Shutoff the vacuum source.
12. Return compressor to upright position and reconnect hoses to there original state.
13. Remove the bowl and discard the oil properly.

PROCEDURE COMPLETE

Filling oil

1. Use the hose that connects to the vacuum port on the compressor, disconnect it from the block.
2. Pour 10 ounces of compressor oil (3GS/ 300 ves.) into container and insert the hose into the oil.
3. Plug in cord into outlet and turn on unit.
4. Program unit for 5 minutes of vacuum. As pump is energized the oil will be drawn into the pump in seconds.
5. When finished press "Cancel" to stop the pump. Reassemble pump and hoses.

OIL FILL COMPLETE

PROCEDURE TO DISASSEMBLE BLOCK ASSEMBLY

CAUTION: *ALWAYS WEAR GOGGLES AND RELEASE PRESSURE BEFORE REMOVING ANY COMPONENTS. TO RELIEVE PRESSURE IN SUCTION SEPARATOR BOWL, ENTER S. S. MODE BY PRESSING THE SWITCH BY THE S. S. BOWL.*

SOLENOID DESCRIPTION	PART NUMBER	QTY.	DESCRIPTION	PART NUMBER	QTY.
Normally Closed	0304-0905-01	9	O-Ring (Small, S7)	0617-0211-01	1
Normally Open through (S7)	0304-0905-02	1	O-Ring (Med.)	0617-0211-02	9
Normally Open (Liquid, S11)	0304-0905-03	1	O-Ring (Large)	0617-0211-03	-
Normally Closed through (S14)	0304-0905-04	1	O-Ring (Extra Large)	0617-0211-04	14

In order to service one of the sandwiched solenoids you will have to disassemble the block.

NOTE: *S7 solenoid connects both blocks. There will be an o-ring between the top of S7 and the front block. Front block will detach.*

Remove four countersunk screws, carefully move block assembly forward so it can be supported.

Disassemble solenoid found defective in self diagnostics. Simply remove the top nut and housing/coil assembly.

Then remove the shaft assembly with a flat blade screw driver from the brass solenoid body.

Remove the plunger guide from shaft assembly.

Clean solenoid body and replace O-ring; check plunger guide.

Once all parts have been cleaned, lubricated, or changed reassemble solenoid.

Reinstall solenoid back in block.

Reassemble block making sure O-ring from S7 is in place (a little oil might help).

PROCEDURE COMPLETE

CHAPTER 4
PARTS

PARTS BY PICTORIAL

This chapter describes assemblies/subassemblies/parts considered replaceable at on-site field installation.

NOTE: The following is a breakdown description for Serial Numbers:

Serial Number Location - Rear Cabinet top right hand side.

Example: 0194B0101

01 Month MFG.
94 Year MFG.
B Serial Rev.
0101 Number of Units Built.

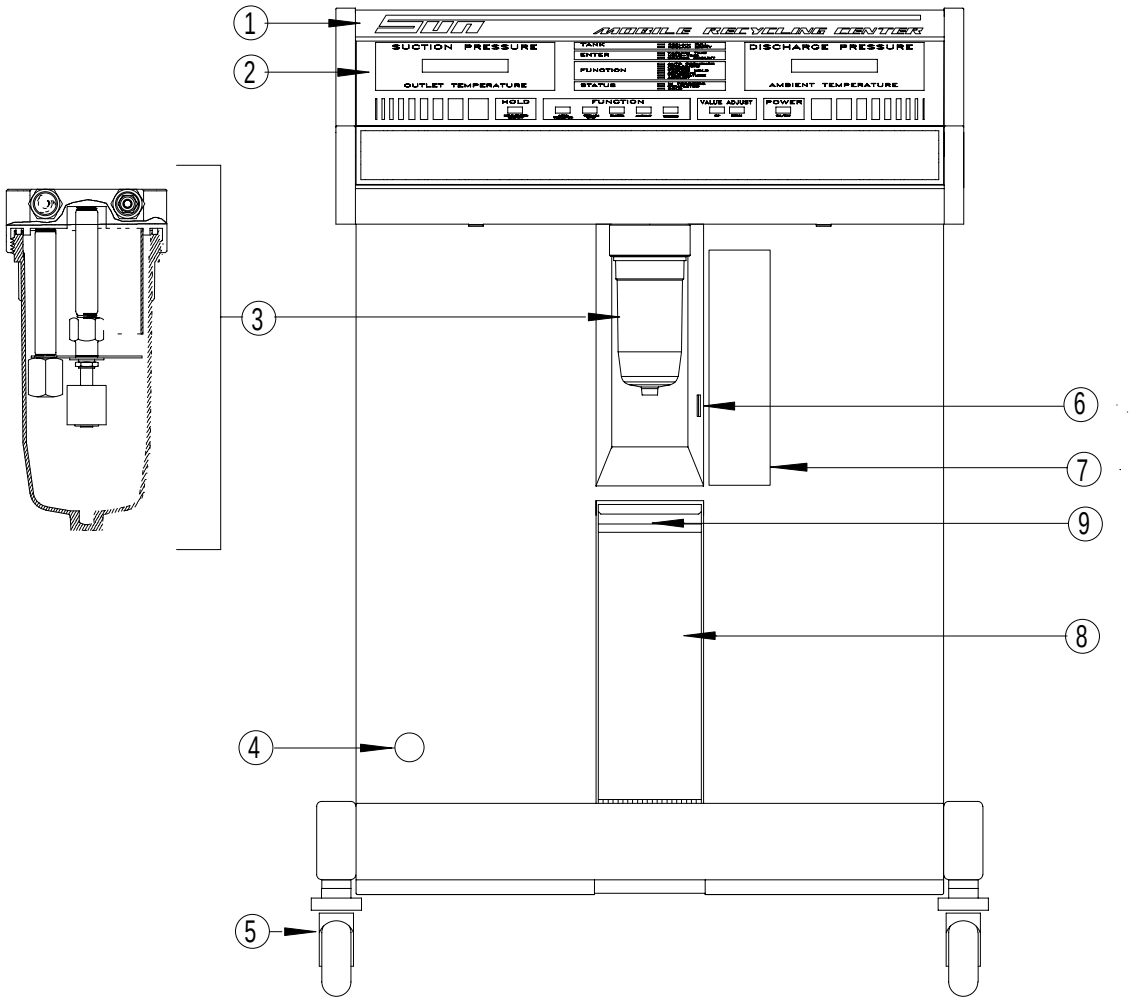
SERIAL B SOFTWARE STARTS WITH 2. XX ON POWER UP.

KEY **NS** = Not Shown

***** = Ford

\# = Crysler

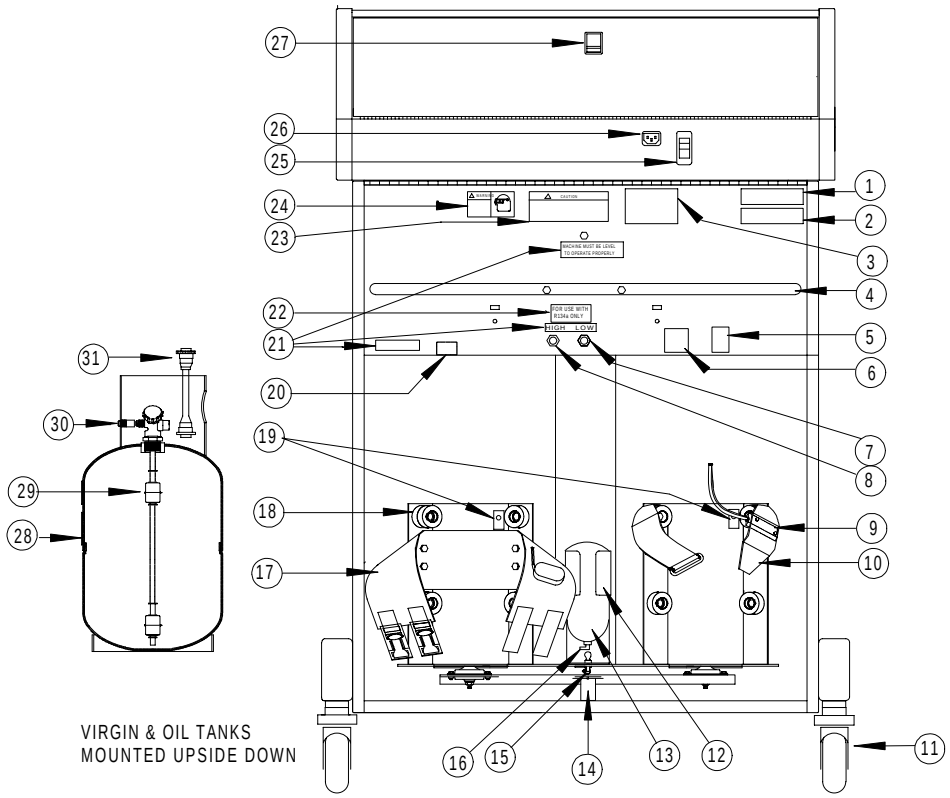
FRONT VIEW



ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1.	Headsign, Sun Decal	0682-0964-01	7.	Label, Service	0682-0969-01
2.	Control Panel, Assy.	See Page 4-5	8a.	Master Filter Kit R12	1095-0178-04
3.	Suction Separator	See Page 4-9	8b.	Master Filter Kit (R134a)½"	1095-0178-03
4.	Moisture Indicator	7009-2346-01	9.	Latch	2397-0203
5a.	Caster, W / Brake (Post)	3645-0054-02	N.S.*	Desiccant Bags (Qty. 10)	0671-1018-02
5b.	Caster, W / Brake (Bolt)	3645-0056-02	N.S.*	Master Filter Drier	7009-2099-01
6.	Switch, Service	0764-0254-01	N.S.*	Gasket	4053-0020-01

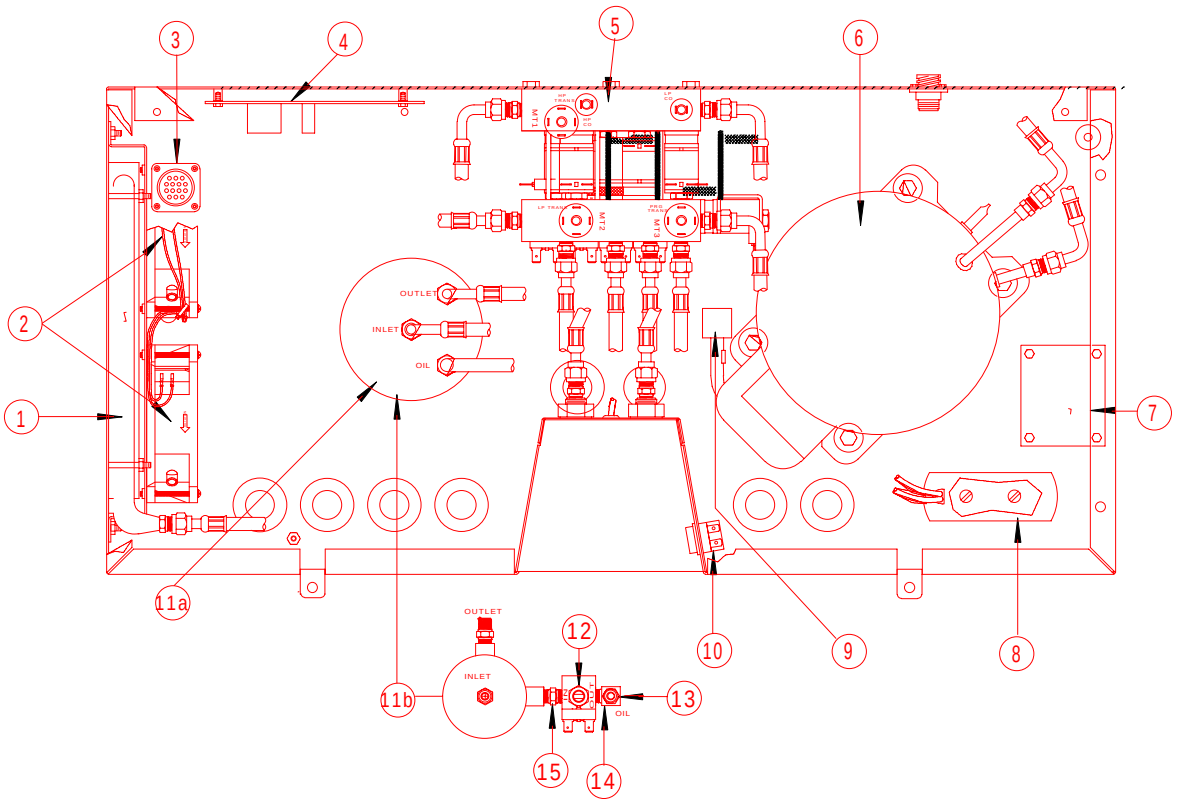
NOTE: * = Included in Master Filter Kit
NOTE: Casters for Sun version use shaft type. Casters for Snap-On version use post type.

REAR VIEW



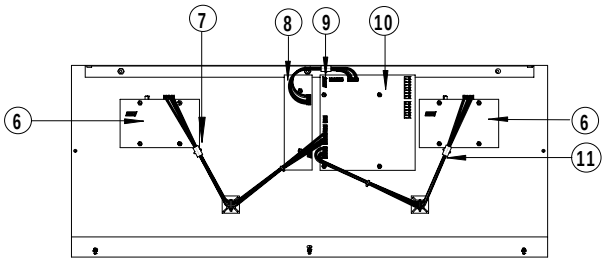
ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1.	Label, "Caution Vent"	0682-1038-01	17a.	Heater Blanket, 110VAC	0518-0024-01
2.	Label, "French Use of"	0682-1039-01	17b.	Heater Blanket, 220VAC	0518-0024-02
3.	Label, "Caution Use of"	0682-0873-01	18.	Bumpers	1489-0017-01
4.	Bracket	7012-1369-01	19.	Switch, Tank (2)	0799-0237-01
5.	Label, "Service Procedure"	0682-0969-01	20.	Connector, CPC 4 Pin	4162-0831-01
6.	Label, "Warning"	0682-0968-01	21.	Label, Info Guide	0682-0970-01
7.	Fitting, R12 Bulkhead	0647-0285-01	22.*	Label, R134a ONLY	0682-0760-01
8.	Fitting, R134a Bulkhead	0647-0286-01	23.	Label, Caution	0682-1052-01
9.	Sensor, Temperature	7009-2405-01	24.	Label, Eye Warning	0682-1051-01
10a.	Strap, Right (30 lb.)	0424-0806-01	25.	Switch, On/Off/	1922-0118-01
10b.	Strap, Right (50 lb.)	0424-0806-02	26.	A.C. socket	4162-7015-01
10c.	Strap, Left	0424-0805-02	27.	Latch	5666-0049-01
11a.	Caster, W/O Brake, (Shaft)	3645-0054-01	28a.	Tank, 30 lb. R12	7009-2331-01
11b.	Caster, W/O Brake, (Bolt)	3645-0056-01	28b.	Tank, 50 lb. R12	7009-2331-02
12a.	Bracket, Oil	7012-1468-01	28c.	Tank, 30 lb. R134a	7009-2331-03
12b.	Screw, Thumb	0675-0157	28d.	Tank, 50 lb. R134a	7009-2331-04
13a.	Cyl. Disposable Oil	0271-0071-01	29.	Switch, Double Float	0764-0253-01
13b.	Cyl. FORD Oil	0271-0072-01	30a.	Filter, R12 Inline	7009-2417-01
13c.	Cyl. R134a Polyol Ester Oil	EAK0163L00A	30b.	Filter, R134a Inline	7009-2418-01
14a.	Load Cell	7009-2335-01	31.	Cable, Tank Float	6004-0760-01
14b.	Mount, Shock (4)	0561-0148-01	**N.S.**	Cord, A.C.	6001-0197-01
15.	Switch, Oil	2207-0034-01	**N.S.**	Probe, Temp. (Vehicle)	6004-0777-01
16.	Fitting, 90 Degree	0647-0198-01			

TOP VIEW OF PUMP COMPARTMENT

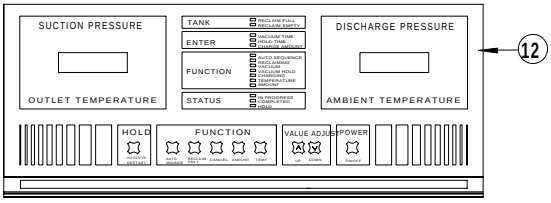


ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1.	Condenser	0111-0703-01	9c.	Relay (On Pump 110v)	0303-0109-07
2a.	Fan, Axial (115v)	0587-0504-01	9d.	Relay (On Pump 220v)	0303-0109-06
2b.	Fan, Axial (220v)	0587-0507-01	9e.	Resistor	0684-0686-01
3.	Connector, 14 Pin	4162-0832-01	10.	Switch, (Momentary)	0764-0254-01
4.	Board, Plumbing	7001-2266-01	11a.	Oil Reservoir, Temprite	7009-2100-02
5.	Manifold Block	See Page 4-6	11b.	Oil Separator, Small	0111-0906-01
6a.	Compressor (110)	7009-2258-02	12.	Solenoid, Separator	0304-0057-01
6b.	Compressor (220)	7009-2258-04	13.	Fitting, Tubo	0647-0206-01
7.	Board, Relay	7001-2230-01	14.	Elbow, 90º	0647-0044
8a.	Capacitor, Start (110v)	0303-0109-09	15.	Nipple, Hex	4982-0076-01
8b.	Capacitor, Start (220v)	0303-0111-04	**NS.**	Kilxon Overload Protector	0303-0109-08
9a.	Cap (Pump Relay 110v)	7009-2348-01	**NS.**	Compressor Oil 3GS/300 viscosity (24oz.)	0681-0179-02
9b.	Cap (Pump Relay 220v)	7009-2348-02			

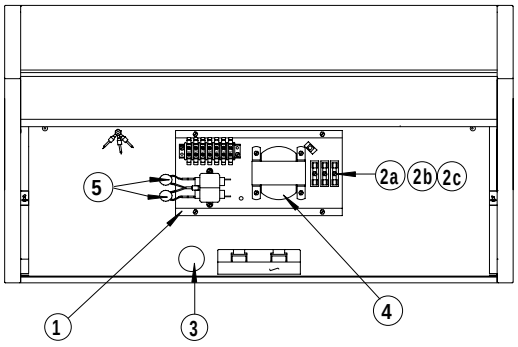
TOP OF HEADFRAME



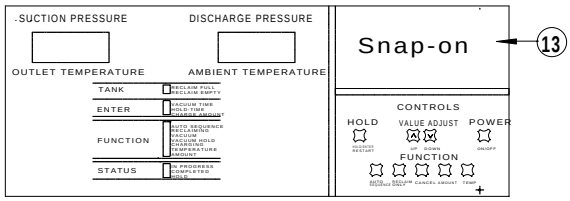
UNDER CONTROL PANEL



MRC/MTC CONTROL PANEL



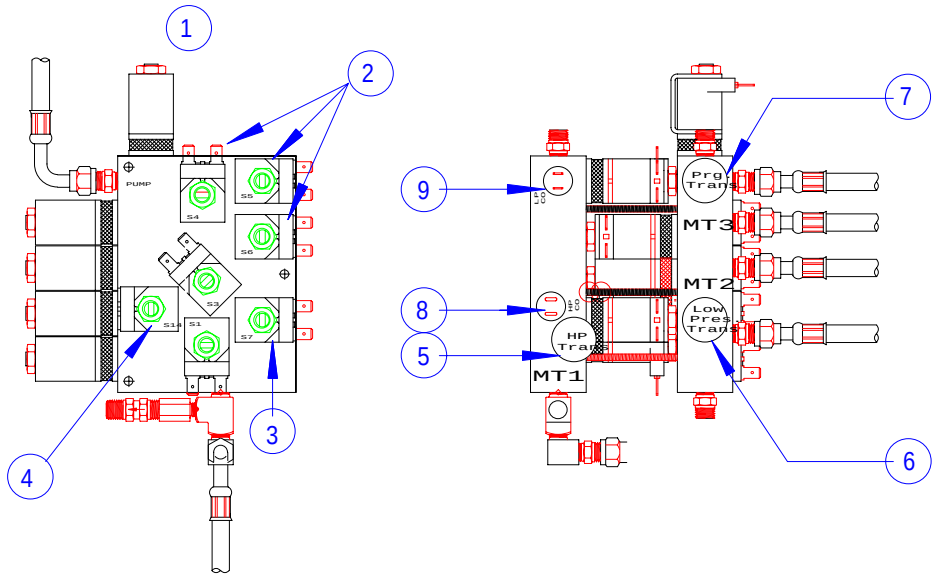
TOP VIEW



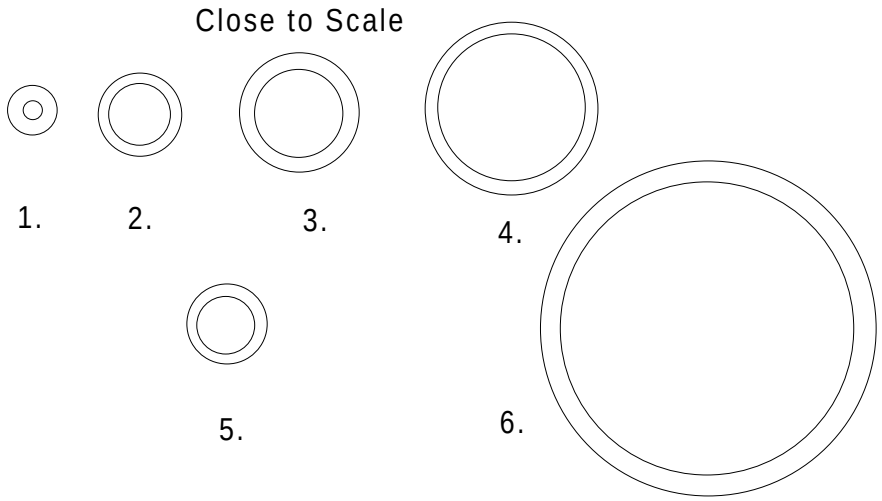
ACT CONTROL PANEL

ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1a.	Power Supply (110V.A.C.)	7009-2323-01	7.	W. H. (Rt. Display)	7076-0897-01
1b.	Power Supply (220V.A.C.)	7009-2323-03	8.	Board, Led Driver	7001-2159-01
1c.	Power Supply (100V.A.C.)	7009-2323-02	9.	W.H. (Led Display)	7076-0896-01
2a.	Fuse, F1 (.25 amp)	0739-0119-01	10.	Board, Processor	7001-2188-02
2b.	Fuse, F2 (1 amp)	0739-0040	11.	W.H. (Left Display)	7076-0897-02
2c.	Fuse, F3 (3 amp)	0739-0103	12a.	Control Panel MRC400	7005-2475-01
3.	Alarm	0316-0205-01	12b.	Control Panel MRC450	7005-2496-01
4.	Transformer	7009-2333-01	13.	Control Panel, Snap-on	7005-2503-01
5a.	Varistor (115 V)	7009-1320	**N.S.**	Cord, A.C.	6001-0197-01
5b.	Varistor (220 V)	7009-1320-02	**N.S.**	Pem-Nut	0440-0464-02
6.	Board, LCD Driver	7001-2153-01			

MANIFOLD BLOCK ASSEMBLY

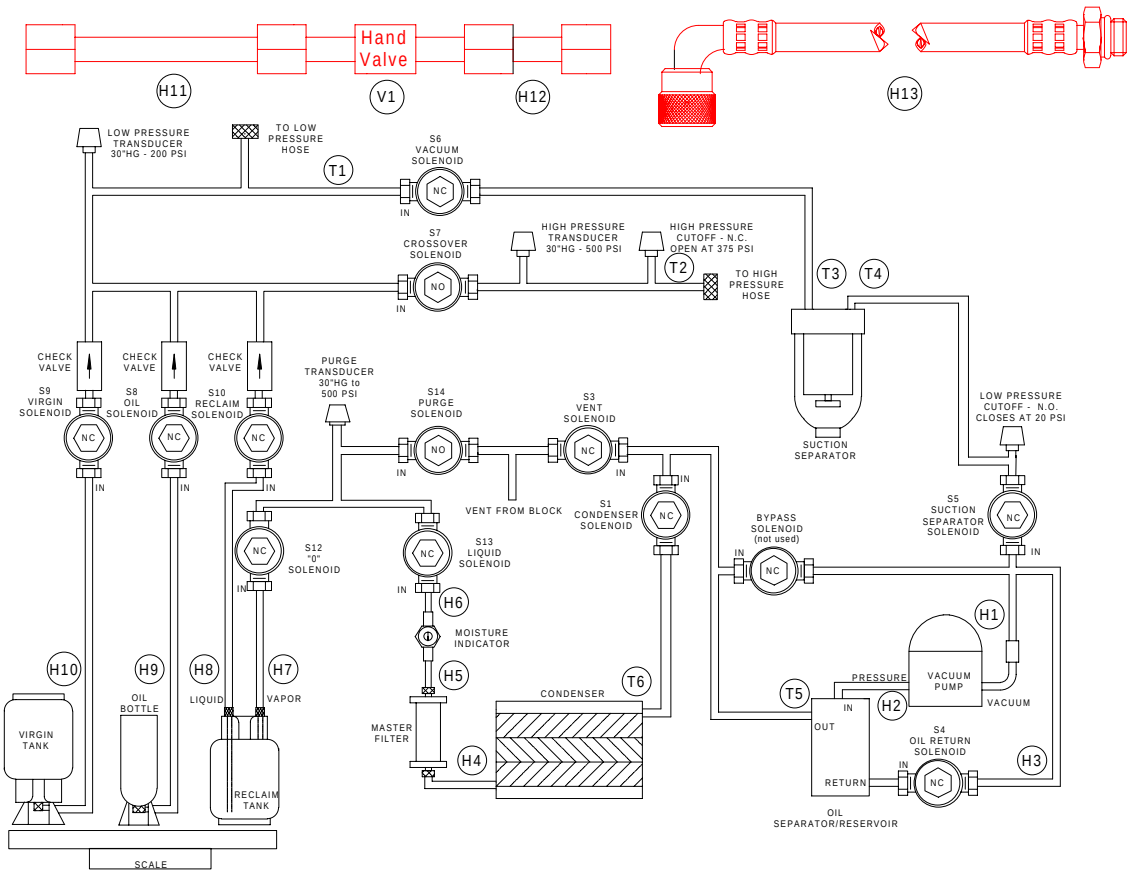


ITEM		DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1.		Manifold	7009-2393-06	6.	Transducer, Low Pres.	0514-0029-01
2.		Solenoid, N.C.	0304-0905-01	7.	Transducer, Purge Pres.	0514-0030-01
3.	*	Solenoid, N.O.(S7 X-Over)	0304-0905-03	8.	Switch, High Pressure	0549-0036-01
4.	*	Solenoid, N.C. (Purge)	0304-0905-04	9.	Switch, Low Pressure	0549-0035-01
5.		Transducer, High Pressure	0514-0030-01	**N.S.**	Plunger, (In Solenoid)	7009-2499-01
		***** *Refers to Feed Through*		**N.S.**	Allen Screw (Qty.=5)	0938-0160-01



ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1.	O-Ring (Tiny S7)	0617-0211-01	6.	O-Ring 2oz.	0617-0219-01
2.	O-Ring (Small)	0617-0211-02	**NS**	O-Ring Block Kit (Qty 42)	0617-0211-07
3.	O-Ring (Medium)	0617-0211-03	**NS**	Screw, Phillips	0406-0148-01
4.	O-Ring (Large)	0617-0211-04	**NS**	Permabond	0626-0575-01
5.	O-Ring (Front Blocks)	0617-0211-06	**NS**	Super Lube, 3 oz.	0681-0193-03

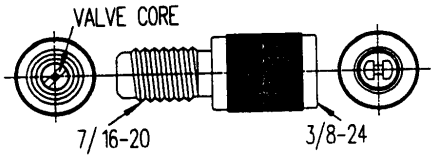
HOSE PART NUMBERS



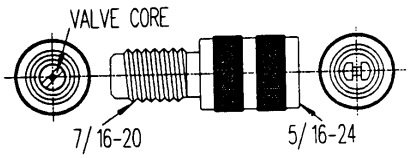
ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
T1	Tube (Aluminum)	7009-2427-01	H8a	Hose, 37” R-12 Blue	3988-0298-03
T2	Tube (Aluminum)	7009-2428-01	H8b	Hose, 37” R-134a Blue	3988-0279-03
T3	Tube (Aluminum)	7009-2432-01	H9a	Hose, 33” R-12 Yel.	3988-0270-02
T4	Tube (Aluminum)	7009-2433-01	H9b	Hose, 33” R-134a Yel	3988-0307-01
T5	Tube (Aluminum)	7009-2430-01	H10a	Hose, 46” R-12 Blue	3988-0298-04
T6	Tube (Aluminum)	7009-2429-01	H10b	Hose, 46” R-134a Blue	3988-0279-04
H1	Hose, 18: Red	3988-0283-01	H11a	Hose, 96” Blue (90º)	3988-0292-01
H2	Hose, 24” Red	3988-0283-02	H11b	Hose, 96” Red (90º)	3988-0293-01
H3	Hose, 18”	3988-0283-01	H12a	Hose, 10” Blue	3988-0234-02
H4a	Hose, 22” R-12 Blue	3988-0302-02	H12b	Hose, 10” Red	3988-0233-02
H4b	Hose, 22” R-134a Blue	3988-0279-01	H13a	Hose, 96” Blue (90º)	EAH0001C02A
H5a	Hose, 22” R-12 Blue	3988-0298-01	H13b	Hose, 96” Red (90º)	EAH0001C01A
H5b	Hose, 22” R-134a Blue	3988-0279-01	V1	Valve, Hand	5121-0004-01
H6a	Hose, 36” R-12 Red	3988-0300-01	N.S.	R134a Utility (36”)	3988-0278-01
H6b	Hose, 36” R-134a Red	3988-0281-01	N.S.	R134a Utility (8”)	3988-0278-02
H7a	Hose, 46” R-12 Red	3988-0298-02			
H7b	Hose, 46” R-134a Red	3988-0279-02			

NOTE: ***The first production run of MRC-450’s (0093) were made with ¼” flare fitting, this kit 1095-0276-02 will update unit to current level.***

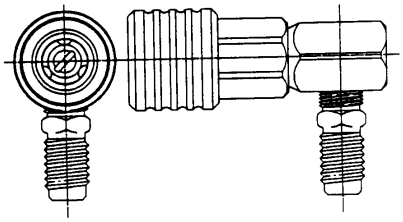
ADAPTERS / FITTINGS



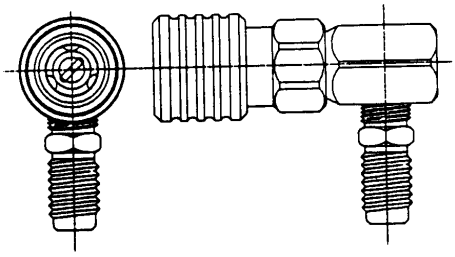
GM ADAPTER
0647-0196-01



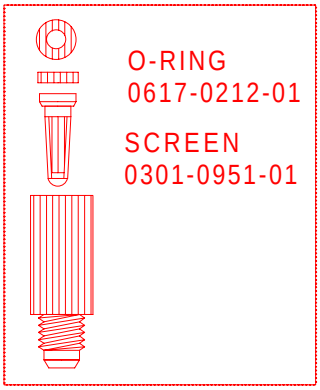
FORD ADAPTER
0647-0200-01



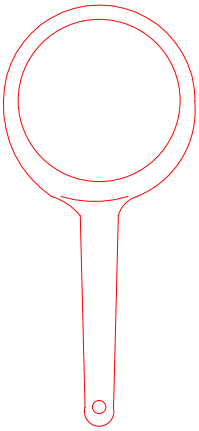
LARGE GM ADAPTER QUICK DISCONNECT
0647-0199-01



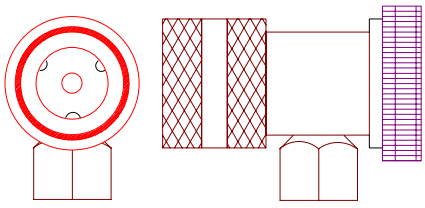
GM/FORD ADAPTER QUICK DISCONNECT
0647-0197-01



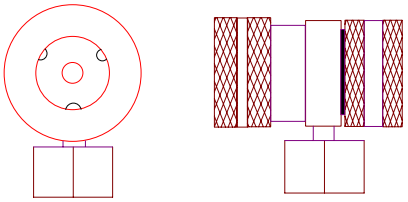
INLINE FILTER
7009-2417-01 (R-12)
7009-2418-01 (R134a)



FILTER WRENCH
0001-0067-01

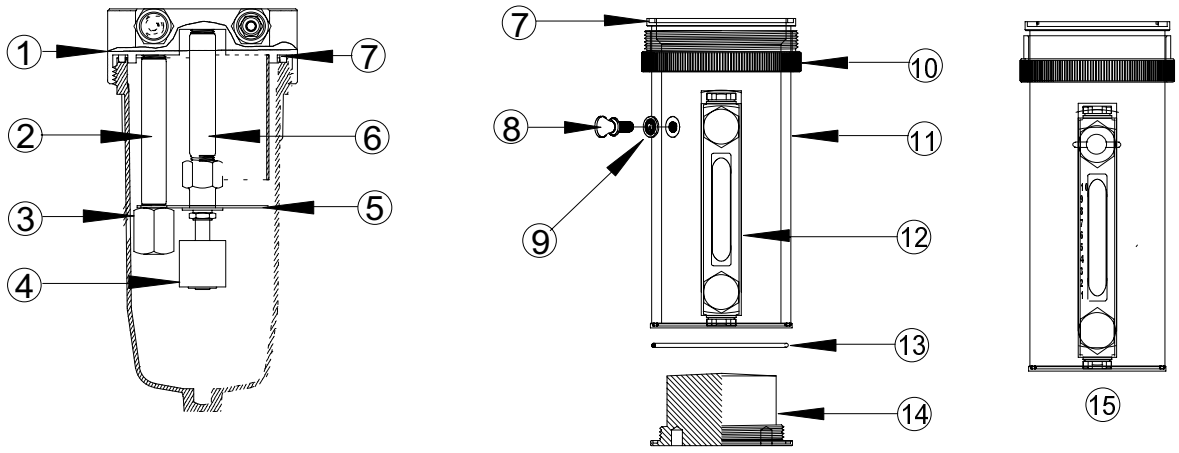


HIGH	0647-0287-07
LOW	0647-0287-08
O-Ring Kit	EAK0027C00AS



HIGH	0647-0287-09
LOW	0647-0287-10
O-Ring Kit	ARG 04040

SUCTION SEPARATOR VIEW



ITEM	DESCRIPTION	EQUI SERV #
1.	Cap and shield	7020-1982-01
2.	Fitting, nipple	4982-0074-01
3.	Atomizer Fitting	7024-0511-01
4a.	Float Switch Assembly	7009-2102-01
4b.	Float	0546-0017-01
5.	Plate	4982-0076-01
6.	Fitting, nipple	4982-0073-01
7.	Gasket, Bowl	4053-0020-01
8.	Thumbscrew	0938-0158-01
9.	Washer	0400-5605-01
10.	Ring, Mounting Bowl	0382-0512-01
11.	Bowl, Suction Separator (Aluminum)	0382-0513-01
12.	Gauge, Liquid Level	0330-0010-01
13.	O-Ring, Bottom Cap	0617-0220-01
14.	Bowl, Bottom Cap	0382-0514-01
15.	Bowl Kit, Metal (Solid bowl)	EAK0071C00AS

PARTS IN ALPHABETICAL ORDER

NAME	PART NUMBER	400 4100	450 4500	COMMENTS
Adapter, FORD	0647-0200-01	X		Standard Screw Fitting
Adapter, GM	0647-0196-01	X		Standard Screw Fitting
Adapter, GM	0647-0199-01	X		Quick Disconnect
Adapter, GM/FORD	0647-0197-01	X		Quick Disconnect
Adapter, High	0647-0287-08		X	Uniweld
Adapter, Low	0647-0287-07		X	Uniweld
Alarm	0316-0205-01	X	X	
Board, LCD Driver	7001-2153-01	X	X	
Board, Led Driver	7001-2159-01	X	X	
Board, Plumbing	7001-2266-01	X	X	
Board, Processor	7001-2188-02	X	X	
Board, Relay	7001-2230-01	X	X	
Bowl	0382-0009-02	X	X	
Bowl, Separator	0382-0513-01	X	X	
Bowl, Bottom Cap	0382-0514-01	X	X	
Bowl, Metal Kit	EAK0071C00AS	X	X	
Bracket	7012-1369-01	X	X	Rear Hose
Bracket, Oil	7012-1468-01	X	X	
Bumpers	1489-0017-01	X	X	
Fitting, Bulkhead	0647-0285-01	X		
Fitting, Bulkhead	0647-0286-01		X	
Cable, Tank Float	6004-0760-01	X	X	
Cap and Shield	7020-1982-01	X	X	Top of S. S. bowl
Capacitor	7009-2348-01	X	X	(Pump Relay 110v)
Capacitor	7009-2348-02	X	X	(Pump Relay 220v)
Capacitor, Start	0303-0109-09	X	X	(110v)
Capacitor, Start	0303-0111-04	X	X	(220v)
Caster, W / Brake	3645-0054-02	X	X	
Caster, W/O Brake	3645-0054-01	X	X	
Caster, W / Brake	3645-0056-02	X	X	
Caster, W/O Brake	3645-0056-01	X	X	
Compressor	7009-2258-02	X	X	(110)
Compressor	7009-2258-04	X	X	(220)
Compressor Oil	0681-0179-02	X	X	3GS/300 viscosity (24oz.)
Condenser	0111-0703-01	X		
Connector, 14 Pin	4162-0832-01	X		
Connector, CPC 4 Pin	4162-0831-01	X		
Control Panel	7005-2475-01	X		MRC-400
Control Panel	7005-2496-01		X	MRC-450
Control Panel	7005-2503-01	X	X	ACT-4100/ACT-4500
Cord, A.C.	6001-0197-01	X	X	
Crush Washer	0647-0296-01	X	X	Copper
Cylinder, Disposable Oil	0271-0071-01	X		
Cylinder, FORD Oil	0271-0072-01	X		
Desiccant Bags	0671-1018-02		X	(Qty. 10)
Desiccant Bags	0671-1026-01	X		(Qty. 10)
Elbow, 90º	0647-0044	X	X	
Fan, Axial	0587-0504-01	X	X	(115v)
Fan, Axial	0587-0507-01	X	X	(220v)
Filter, Inline	7009-2417-01	X		¼" Flare
Filter, Inline	7009-2418-01		X	½" Acme
Fitting, 90 Degree	0647-0198-01	X	X	
Fitting, Atomizer	7024-0511-01	X	X	
Fitting, nipple	4982-0074-01	X	X	In S. S. bowl

NAME	PART NUMBER	400 4100	450 4500	COMMENTS
Fitting, Tubo	0647-0206-01	X	X	
Fitting, nipple	4982-0073-01	X	X	In S. S. bowl
Float	0546-0017-01	X	X	
Fuse, F1	0739-0119-01	X	X	(.25 amp)
Fuse, F2	0739-0040	X	X	(1 amp)
Fuse, F3	0739-0103	X	X	(3 amp)
Gasket	4053-0020-01	X	X	
Gauge, Liquid level	0330-0010-01	X	X	Metal Bowl
Headsign, Sun Decal	0682-0964-01	X	X	
Heater Blanket,	0518-0024-01	X	X	110VAC
Heater Blanket,	0518-0024-02	X	X	220VAC
Hose, 10” Blue	3988-0234-02	X	X	Vehicle Hose
Hose, 10” Red	3988-0233-02	X	X	Vehicle Hose
Hose, 18” Red	3988-0283-01	X	X	Input Side of Compressor
Hose, 22” R-12 Blue	3988-0298-01	X		Output Side of Master Filter
Hose, 22” R-12 Blue	3988-0302-02	X		Input Side of Master Filter
Hose, 22” R-134a Blue	3988-0279-01		X	Input & Output Side of Master Filter
Hose, 24” Red	3988-0283-02	X	X	Output Side of Compressor
Hose, 33” R-134a Yel.	3988-0307-01	X		Output Side of Oil Cylinder, R134a
Hose, 33” R-12 Yel	3988-0270-02		X	Output Side of Oil Cylinder, R12
Hose, 36” R-12 Red	3988-0300-01	X		Output Side of Moisture Indicator
Hose, 36” R-134a Red	3988-0281-01		X	Output Side of Moisture Indicator
Hose, 37” R-12 Blue	3988-0298-03	X		Output Side of Recovery Tank
Hose, 37” R-134a Blue	3988-0279-03		X	Output Side of Recovery Tank
Hose, 46” R-12 Blue	3988-0298-04	X		Output Side of Virgin Tank
Hose, 46” R-12 Red	3988-0298-02	X		Input Side of Recovery Tank
Hose, 46” R-134a Blue	3988-0279-04		X	Output Side of Virgin Tank
Hose, 46” R-134a Red	3988-0279-02		X	Input Side of Recovery Tank
Hose, 96” Blue (90º)	3988-0292-01	X		Vehicle Hose
Hose, 96” Blue (90º)	EAH0001C02A		X	Vehicle Hose
Hose, 96” Red (90º)	3988-0293-01	X		Vehicle Hose
Hose, 96” Red (90º)	EAH0001C01A		X	Vehcile Hose
Indicator, Moisture	7009-2346-01	X	X	
Inlet Tube	4982-0074-01	X	X	
Kit, Master Filter	1095-0178-03		X	Filter, 10 Desiccant Bags, & O-Ring
Kit, Master Filter	1095-0178-04	X		Filter, 10 Desiccant Bags, & O-Ring
Kit, O-Ring	ARG04040		X	For R-134a Adapters -09/-10
Kit, O-Ring	EAK0027C00AS		X	For R-134a Adapters -07/-08
Label	0682-0760-01		X	“R134a ONLY”
Label	0682-0873-01	X	X	"Caution Use of"
Label	0682-0968-01	X	X	"Warning"
Label	0682-0969-01	X	X	"Service Procedure"
Label	0682-0970-01	X	X	“Info Guide”
Label	0682-1038-01	X	X	"Caution Vent"
Label	0682-1039-01	X	X	"French Use of"
Label	0682-1051-01	X	X	“Eye Warning”
Label	0682-1052-01	X	X	“Caution”
Latch	5666-0049-01	X	X	
Load Cell	7009-2335-01	X	X	
Master Filter Drier	7009-2099-01	X		
Master Filter Drier	7009-2426-01		X	
Mount, Shock	0561-0148-01	X	X	Qty. (4)
Nipple, Hex	4982-0076-01	X	X	
O-Ring	0617-0211-01	X	X	(Tiny S7)
O-Ring	0617-0211-02	X	X	(Small)
O-Ring	0617-0211-03	X	X	(Medium)
O-Ring	0617-0211-04	X	X	(Large)

NAME	PART NUMBER	400 4100	450 4500	COMMENTS
O-Ring	0617-0211-06	X	X	Between the front 2 blocks
O-Ring	0617-0211-07	X	X	O-ring kit for entire block, Qty. 42
O-Ring	0617-0212-01	X		Inline hand valve
O-Ring	0617-0219-01		X	2 ounce oil charge cylinder
O-Ring, Bottom of bowl	0617-0220-01	X	X	Metal bowl
Permabond	0626-0575-01	X	X	
Plate	4982-0076-01	X	X	In S. S. bowl
Power Supply	7009-2323-01	X	X	(110V.A.C.)
Power Supply	7009-2323-02	X	X	(100V.A.C.)
Power Supply	7009-2323-03	X	X	(220V.A.C.)
Probe, Temp.	6004-0777-01	X	X	(Vehicle)
Relay	0303-0109-06	X	X	(On Pump 220v)
Relay	0303-0109-07	X	X	(On Pump 110v)
Resistor	0684-0686-01	X	X	
Screw, Phillips	0406-0148-01	X	X	
Screw, Thumb	0675-0157	X	X	Oil Bracket
Sensor	7009-2405-01	X	X	Temperature
Solenoid	0304-0905-01	X	X	Normally Closed
Solenoid	0304-0905-03	X	X	Normally Open; (S7 Xover / S14 Purge)
Solenoid, Separator	0304-0057-01	X	X	
Strap, Velcro	0424-0805-02	X	X	Left
Strap, Velcro	0424-0806-01	X	X	Right (30 lb.)
Strap, Velcro	0424-0806-02	X	X	Right (50 lb.)
Suction Separator	7009-2185-01	X	X	
Super Lube	0681-0193-03	X	X	3 oz.
Switch	0549-0035-01	X	X	Low Pressure
Switch	0549-0036-01	X	X	High Pressure
Switch	0764-0253-01	X	X	Double Float
Switch	0764-0254-01	X	X	(Momentary)
Switch	0764-0254-01	X	X	Service
Switch	0799-0237-01	X	X	Tank (2)
Switch	1922-0118-01	X	X	On/Off
Switch	2207-0034-01	X	X	Oil
Switch	7009-2102-01	X	X	Float
Tank, Recovery	7009-2331-01	X		30 lb.
Tank, Recovery	7009-2331-02	X		50 lb.
Tank, Recovery	7009-2331-03	X	X	Vehicle temperature probe
Thumbscrew	0938-0158-01	X	X	Metal Bowl
Tank, Recovery	7009-2331-04		X	50 lb.
Temperature Probe	6004-0777-01	X	X	Vehicle
Transducer	0514-0029-01	X	X	Low Pressure
Transducer	0514-0030-01	X	X	High Pressure
Transducer	0514-0030-01	X	X	Purge Pressure
Transformer	7009-2333-01	X	X	
Tube (Aluminum)	7009-2427-01	X	X	To Low Pressure Side
Tube (Aluminum)	7009-2428-01	X	X	To High Pressure Side
Tube (Aluminum)	7009-2429-01	X	X	Input Side of Condenser
Tube (Aluminum)	7009-2430-01	X	X	Output side of Oil Separator
Tube (Aluminum)	7009-2432-01	X	X	Input Side of Suction Separator Bowl
Tube (Aluminum)	7009-2433-01	X	X	Output Side of Suction Separator Bowl
Valve, Hand	5121-0004-01	X		
Varistor	7009-1320	X	X	(115 V)
Varistor	7009-1320-02	X	X	(220 V)
Wrench, Filter	0001-0067-01	X	X	
Washer	0400-5605-01	X	X	Metal bowl

PARTS IN NUMERICAL ORDER

NAME	PART NUMBER	400 4100	450 4500	COMMENTS
Wrench, Filter	0001-0067-01	X	X	
Condenser	0111-0703-01	X		
Cylinder, Disposable Oil	0271-0071-01	X		
Cylinder, FORD Oil	0271-0072-01	X		
Relay	0303-0109-06	X	X	(On Pump 220v)
Relay	0303-0109-07	X	X	(On Pump 110v)
Capacitor, Start	0303-0109-09	X	X	(110v)
Capacitor, Start	0303-0111-04	X	X	(220v)
Solenoid, Separator	0304-0057-01	X	X	
Solenoid	0304-0905-01	X	X	Normally Closed
Solenoid	0304-0905-03	X	X	Normally Open; (S7 Xover / S14 Purge)
Alarm	0316-0205-01	X	X	
Gauge, Liquid level	0330-0010-01	X	X	Metal Bowl
Bowl	0382-0009-02	X	X	
Bowl, Separator	0382-0513-01	X	X	
Bowl, Bottom Cap	0382-0514-01	X	X	
Washer	0400-5605-01	X	X	Metal bowl
Screw, Phillips	0406-0148-01	X	X	
Strap, Velcro	0424-0805-02	X	X	Left
Strap, Velcro	0424-0806-01	X	X	Right (30 lb.)
Strap, Velcro	0424-0806-02	X	X	Right (50 lb.)
Transducer	0514-0029-01	X	X	Low Pressure
Transducer	0514-0030-01	X	X	High Pressure
Transducer	0514-0030-01	X	X	Purge Pressure
Heater Blanket,	0518-0024-01	X	X	110VAC
Heater Blanket,	0518-0024-02	X	X	220VAC
Float	0546-0017-01	X	X	
Switch	0549-0035-01	X	X	Low Pressure
Switch	0549-0036-01	X	X	High Pressure
Mount, Shock	0561-0148-01	X	X	Qty. (4)
Fan, Axial	0587-0504-01	X	X	(115v)
Fan, Axial	0587-0507-01	X	X	(220v)
O-Ring	0617-0211-01	X	X	(Tiny S7)
O-Ring	0617-0211-02	X	X	(Small)
O-Ring	0617-0211-03	X	X	(Medium)
O-Ring	0617-0211-04	X	X	(Large)
O-Ring	0617-0211-06	X	X	Between the front 2 blocks
O-Ring	0617-0211-07	X	X	O-ring kit for entire block, Qty. 42
O-Ring	0617-0212-01	X		Inline hand valve
O-Ring	0617-0219-01		X	2 ounce oil charge cylinder
O-Ring, Bottom of bowl	0617-0220-01	X	X	Metal bowl
Permabond	0626-0575-01	X	X	
Elbow, 90º	0647-0044	X	X	
Adapter, GM	0647-0196-01	X		Standard Screw Fitting
Adapter, GM/FORD	0647-0197-01	X		Quick Disconnect
Fitting, 90 Degree	0647-0198-01	X	X	
Adapter, GM	0647-0199-01	X		Quick Disconnect
Adapter, FORD	0647-0200-01	X		Standard Screw Fitting
Fitting, Tubo	0647-0206-01	X	X	
Fitting, Bulkhead	0647-0285-01	X		
Fitting, Bulkhead	0647-0286-01		X	
Adapter, Low	0647-0287-07		X	Uniweld
Adapter, High	0647-0287-08		X	Uniweld
Crush Washer	0647-0296-01	X	X	Copper
Desiccant Bags	0671-1018-02		X	(Qty. 10)
Desiccant Bags	0671-1026-01	X		(Qty. 10)

NAME	PART NUMBER	400 4100	450 4500	COMMENTS
Screw, Thumb	0675-0157	X	X	Oil Bracket
Compressor Oil	0681-0179-02	X	X	3GS/300 viscosity (24oz.)
Super Lube	0681-0193-03	X	X	3 oz.
Label	0682-0760-01		X	“R134a ONLY”
Label	0682-0873-01	X	X	"Caution Use of"
Headsign, Sun Decal	0682-0964-01	X	X	
Label	0682-0968-01	X	X	"Warning"
Label	0682-0969-01	X	X	"Service Procedure"
Label	0682-0970-01	X	X	“Info Guide”
Label	0682-1038-01	X	X	"Caution Vent"
Label	0682-1039-01	X	X	"French Use of"
Label	0682-1051-01	X	X	“Eye Warning”
Label	0682-1052-01	X	X	“Caution”
Resistor	0684-0686-01	X	X	
Fuse, F2	0739-0040	X	X	(1 amp)
Fuse, F3	0739-0103	X	X	(3 amp)
Fuse, F1	0739-0119-01	X	X	(.25 amp)
Switch	0764-0253-01	X	X	Double Float
Switch	0764-0254-01	X	X	(Momentary)
Switch	0764-0254-01	X	X	Service
Switch	0799-0237-01	X	X	Tank (2)
Thumbscrew	0938-0158-01	X	X	Metal Bowl
Kit, Master Filter	1095-0178-03		X	Filter, 10 Desiccant Bags, & O-Ring
Kit, Master Filter	1095-0178-04	X		Filter, 10 Desiccant Bags, & O-Ring
Bumpers	1489-0017-01	X	X	
Switch	1922-0118-01	X	X	On/Off
Switch	2207-0034-01	X	X	Oil
Caster, W/O Brake	3645-0054-01	X	X	
Caster, W / Brake	3645-0054-02	X	X	
Caster, W/O Brake	3645-0056-01	X	X	
Caster, W / Brake	3645-0056-02	X	X	
Hose, 10” Red	3988-0233-02	X	X	Vehicle Hose
Hose, 10” Blue	3988-0234-02	X	X	Vehicle Hose
Hose, 33” R-12 Yel	3988-0270-02		X	Output Side of Oil Cylinder, R12
Hose, 22” R-134a Blue	3988-0279-01		X	Input & Output Side of Master Filter
Hose, 46” R-134a Red	3988-0279-02		X	Input Side of Recovery Tank
Hose, 37” R-134a Blue	3988-0279-03		X	Output Side of Recovery Tank
Hose, 46” R-134a Blue	3988-0279-04		X	Output Side of Virgin Tank
Hose, 36” R-134a Red	3988-0281-01		X	Output Side of Moisture Indicator
Hose, 18” Red	3988-0283-01	X	X	Input Side of Compressor
Hose, 24” Red	3988-0283-02	X	X	Output Side of Compressor
Hose, 96” Blue (90º)	3988-0292-01	X		Vehicle Hose
Hose, 96” Red (90º)	3988-0293-01	X		Vehicle Hose
Hose, 22” R-12 Blue	3988-0298-01	X		Output Side of Master Filter
Hose, 46” R-12 Red	3988-0298-02	X		Input Side of Recovery Tank
Hose, 37” R-12 Blue	3988-0298-03	X		Output Side of Recovery Tank
Hose, 46” R-12 Blue	3988-0298-04	X		Output Side of Virgin Tank
Hose, 36” R-12 Red	3988-0300-01	X		Output Side of Moisture Indicator
Hose, 22” R-12 Blue	3988-0302-02	X		Input Side of Master Filter
Hose, 33” R-134a Yel.	3988-0307-01	X		Output Side of Oil Cylinder, R134a
Gasket	4053-0020-01	X	X	
Connector, CPC 4 Pin	4162-0831-01	X		
Connector, 14 Pin	4162-0832-01	X		
Fitting, nipple	4982-0073-01	X	X	In S. S. bowl
Fitting, nipple	4982-0074-01	X	X	In S. S. bowl

NAME	PART NUMBER	400 4100	450 4500	COMMENTS
Plate	4982-0076-01	X	X	In S. S. bowl
Valve, Hand	5121-0004-01	X		
Latch	5666-0049-01	X	X	
Cord, A.C.	6001-0197-01	X	X	
Cable, Tank Float	6004-0760-01	X	X	
Probe, Temp.	6004-0777-01	X	X	Vehicle
Temperature Probe	6004-0777-01	X	X	Vehicle
Board, LCD Driver	7001-2153-01	X	X	
Board, Led Driver	7001-2159-01	X	X	
Board, Processor	7001-2188-02	X	X	
Board, Relay	7001-2230-01	X	X	
Board, Plumbing	7001-2266-01	X	X	
Control Panel	7005-2475-01	X		MRC-400
Control Panel	7005-2496-01		X	MRC-450
Control Panel	7005-2503-01	X	X	ACT-4100/ACT-4500
Varistor	7009-1320	X	X	(115 V)
Varistor	7009-1320-02	X	X	(220 V)
Master Filter Drier	7009-2099-01	X		
Switch	7009-2102-01	X	X	Float
Suction Separator	7009-2185-01	X	X	
Compressor	7009-2258-02	X	X	(110)
Compressor	7009-2258-04	X	X	(220)
Power Supply	7009-2323-01	X	X	(110V.A.C.)
Power Supply	7009-2323-02	X	X	(100V.A.C.)
Power Supply	7009-2323-03	X	X	(220V.A.C.)
Tank, Recovery	7009-2331-01	X		30 lb.
Tank, Recovery	7009-2331-02	X		50 lb.
Tank, Recovery	7009-2331-03	X	X	Vehicle temperature probe
Tank, Recovery	7009-2331-04		X	50 lb.
Transformer	7009-2333-01	X	X	
Load Cell	7009-2335-01	X	X	
Indicator, Moisture	7009-2346-01	X	X	
Capacitor	7009-2348-01	X	X	(Pump Relay 110v)
Capacitor	7009-2348-02	X	X	(Pump Relay 220v)
Sensor	7009-2405-01	X	X	Temperature
Filter, Inline	7009-2417-01	X		¼" Flare
Filter, Inline	7009-2418-01		X	½" Acme
Master Filter Drier	7009-2426-01		X	
Tube (Aluminum)	7009-2427-01	X	X	To Low Pressure Side
Tube (Aluminum)	7009-2428-01	X	X	To High Pressure Side
Tube (Aluminum)	7009-2429-01	X	X	Input Side of Condenser
Tube (Aluminum)	7009-2430-01	X	X	Output side of Oil Separator
Tube (Aluminum)	7009-2432-01	X	X	Input Side of Suction Separator Bowl
Tube (Aluminum)	7009-2433-01	X	X	Output Side of Suction Separator Bowl
Bracket	7012-1369-01	X	X	Rear Hose
Bracket, Oil	7012-1468-01	X	X	
Cap and Shield	7020-1982-01	X	X	Top of S. S. bowl
Fitting, Atomizer	7024-0511-01	X	X	
Kit, O-Ring	ARG04040		X	For R-134a Adapters -09/-10
Hose, 96" Red (90º)	EAH0001C01A		X	Vehcile Hose
Hose, 96" Blue (90º)	EAH0001C02A		X	Vehicle Hose
Kit, O-Ring	EAK0027C00AS		X	For R-134a Adapters -07/-08
Bowl, Metal Kit	EAK0071C00AS	X	X	

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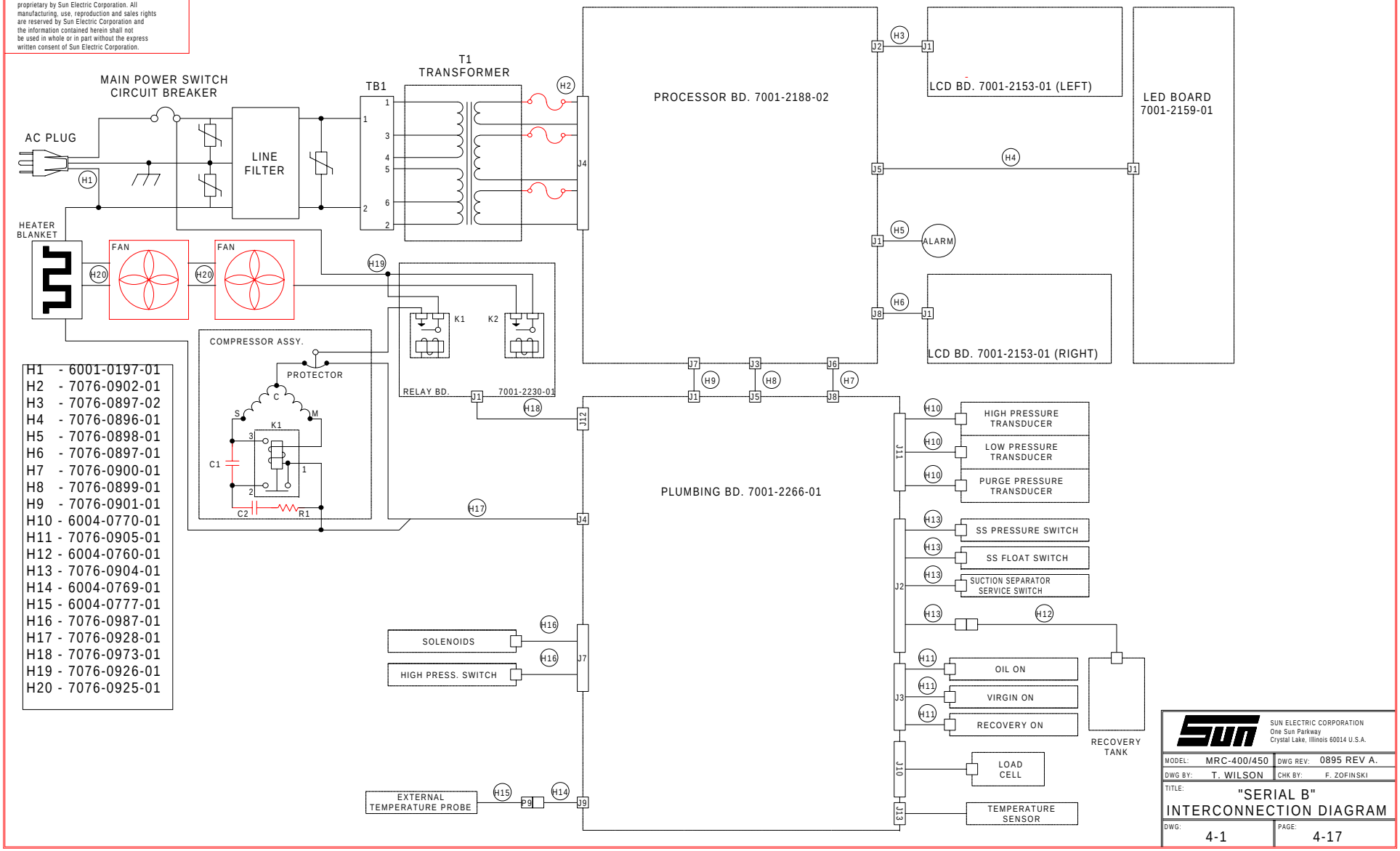


H1	- 6001-0197-01
H2	- 7076-0902-01
H3	- 7076-0897-02
H4	- 7076-0896-01
H5	- 7076-0898-01
H6	- 7076-0897-01
H7	- 7076-0900-01
H8	- 7076-0899-01
H9	- 7076-0901-01
H10	- 6004-0770-01
H11	- 7076-0905-01
H12	- 6004-0760-01
H13	- 7076-0904-01
H14	- 6004-0769-01
H15	- 6004-0777-01
H16	- 7076-0987-01
H17	- 7076-0928-01
H18	- 7076-0973-01
H19	- 7076-0926-01
H20	- 7076-0925-01

SUN ELECTRIC CORPORATION
One Sun Parkway
Crystal Lake, Illinois 60014 U.S.A.

MODEL:	MRC-400/450	DWG REV:	0895 REV A.
DWG BY:	T. WILSON	CHK BY:	F. ZOFINSKI

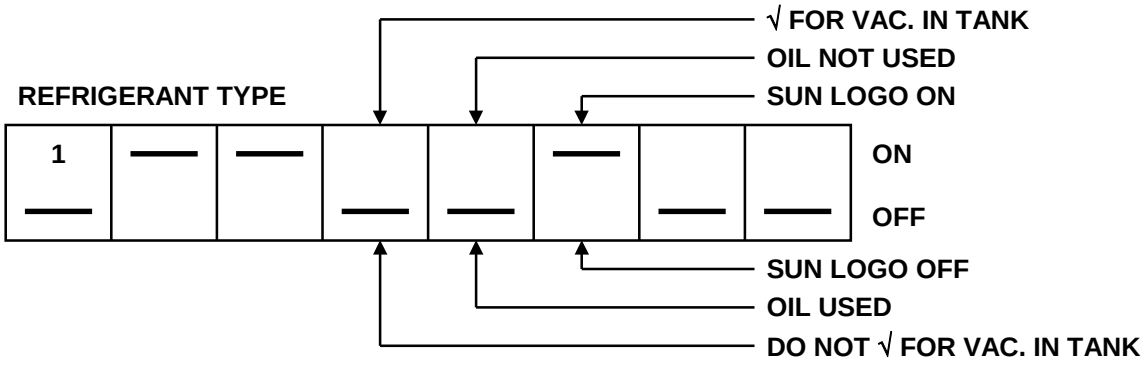
TITLE:
"SERIAL B"
INTERCONNECTION DIAGRAM

DWG:	4-1
PAGE:	4-17

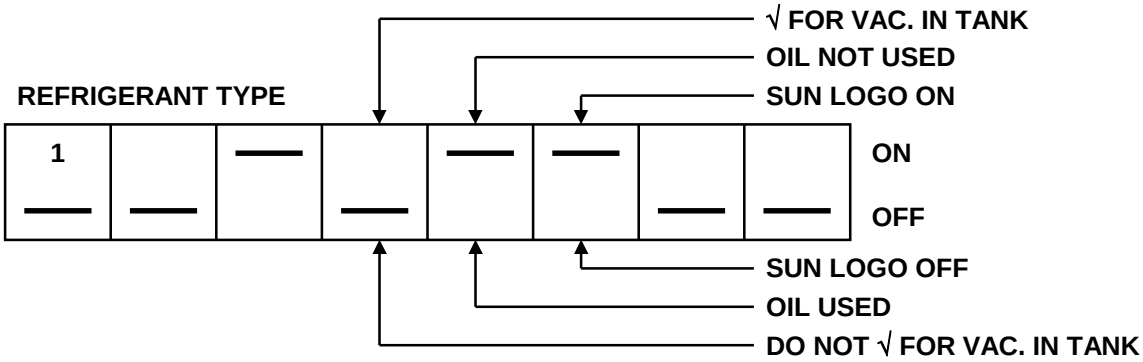
APPENDIX A
CONFIGURATION

MRC-400/ATC-4100 REFRIGERANT TYPE

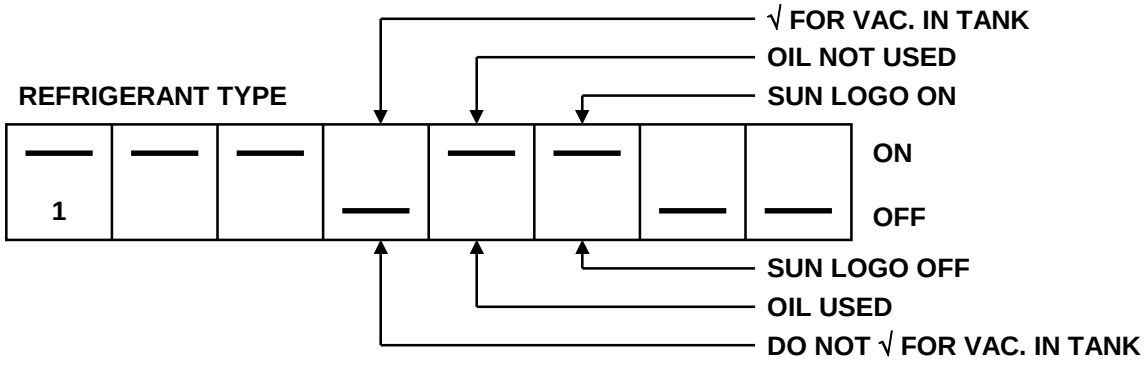
I. USE OF R-12 on Serial "B"



II. USE OF R-500 on Serial "B"

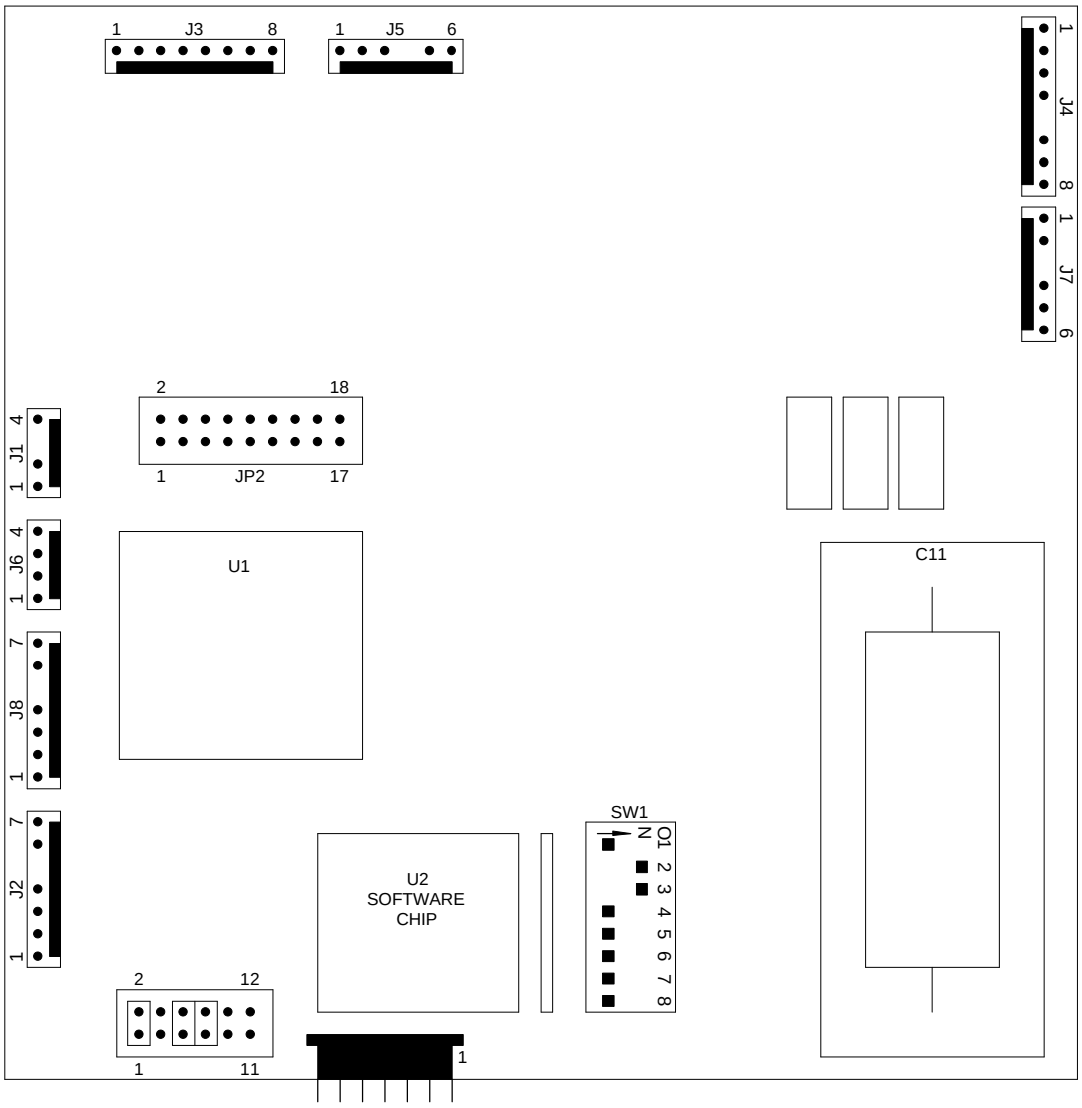


III. USE OF R-134a ON SERIAL "B"

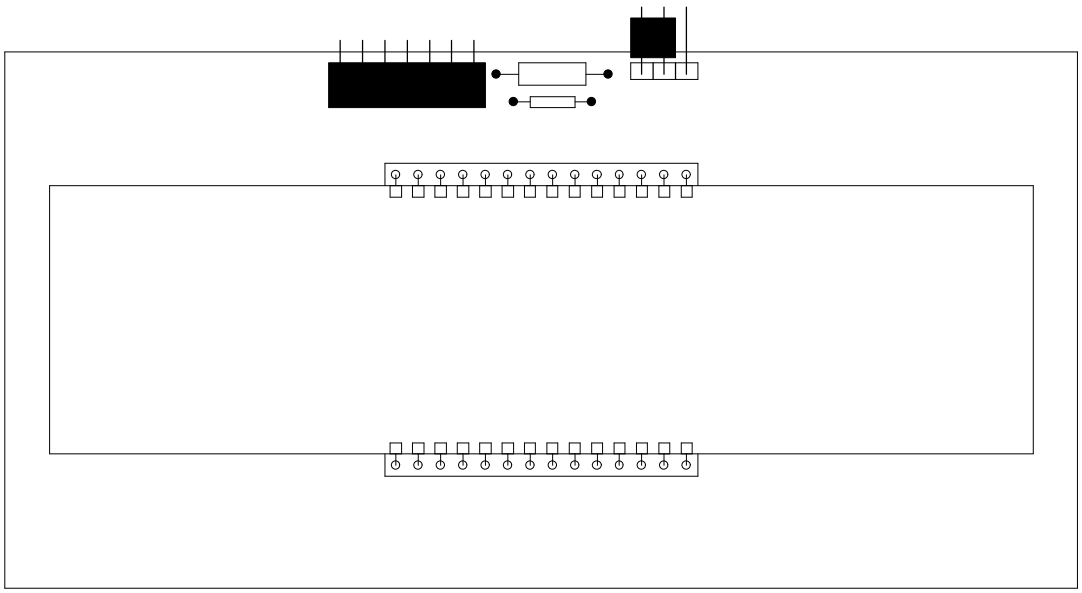


BOARD CONFIGURATIONS

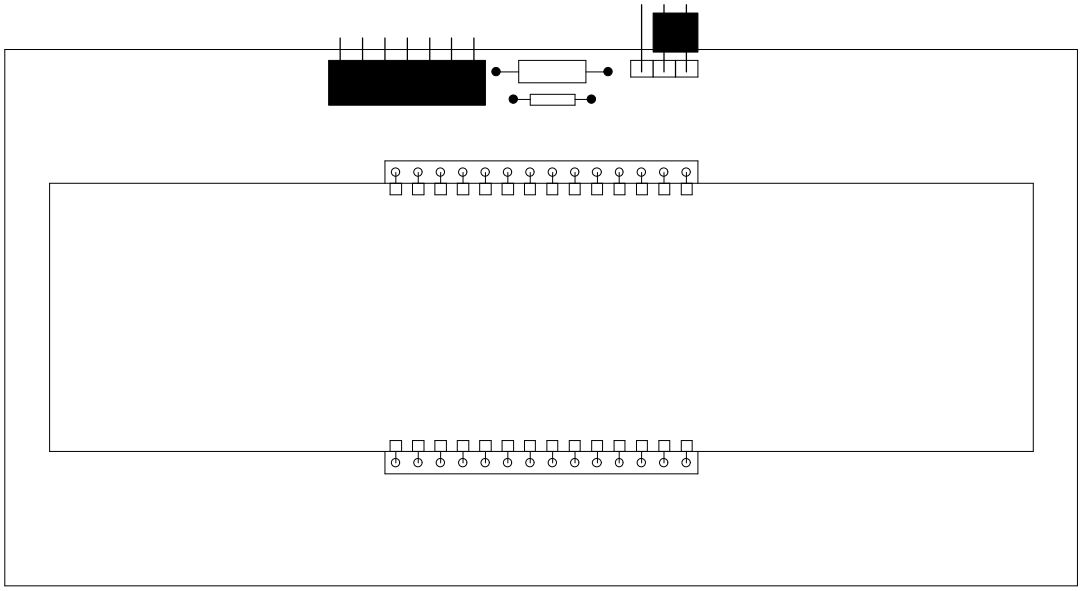
PROCESSOR BOARD 7001-2188-02



LEFT LCD DISPLAY BOARD 7001-2153-01



RIGHT LCD DISPLAY BOARD 7001-2153-01



APPENDIX B
ERROR CODES

The Refrigerant Recovery System has a self-diagnostic feature. When a malfunction with the Recovery System has been detected, an error code is displayed on the LCD panel.

A. Press **<HOLD/ENTER/RESTART>** on the front panel.

B. If the error code is still displayed, press **<CANCEL>** on the front panel to clear or turn "OFF" main power switch

C. Turn the power switch to the "ON" position and press **<POWER>**. This resets all functions.

D. If the error code is still displayed on the front panel, refer to Error Codes listed below:

ERROR CODES 0 THROUGH 13

ERROR CODE	DESCRIPTION	POSSIBLE CAUSE
0	Internal CPU memory failure.	• Replace Processor Board.
1	Communication Bus failure.	• Replace Processor Board.
2	Tank Full	• Charge from or change Recovery Tank.
3	Software Failure.	• Replace Processor Board.
4	Solenoid Driver Failure	• Replace Solenoid Driver Board.
5	No pressure after pump starts.	• Refer to Troubleshooting in Chapter 2.
6	Compressor windings open	• Replace Compressor
7	No weight drop during Refrigerant charge.	• Select other tank. • Check Heater Blanket on Virgin Tank. • With software Rev 2.20, install a new Virgin Tank.
8	No weight drop during Oil charge.	• With software Rev 2.20, install a new Oil Cylinder.
9	Stored weights and scale disagree.	• Not used with Rev 2.20 software.
10	Scale weight less than 2 lbs.	• Refer to Scale Calibration in Chapter 3.
11	Scale weight greater than 155 lbs.	• Refer to Scale Calibration in Chapter 3.
12	Tank full and empty LEDs on.	• Connect Recovery Tank cable. • Ohm out cable. • Check Float Assembly in Recovery Tank.
13	Discharge pressure less than 30" HG.	• Check calibration. • Replace High Pressure Transducer. • Replace Solenoid Driver Board.

ERROR CODES 14 THROUGH 26

ERROR CODE	DESCRIPTION	POSSIBLE CAUSE
14	Discharge pressure greater than 500 psi.	• Check calibration. • Replace High Pressure Transducer. • Replace Solenoid Driver Board.
15	Suction pressure less than 30" HG.	• Check calibration. • Replace Low Pressure Transducer. • Replace Solenoid Driver Board.
16	Suction pressure greater than 200 psi.	• Check calibration. • Replace Low Pressure Transducer. • Replace Solenoid Driver Board.
17	Purge pressure less than 30" HG.	• Check calibration. • Replace Purge Pressure Transducer. • Replace Solenoid Driver Board.
18	Purge pressure greater than 500 psi.	• Check calibration. • Replace Purge Pressure Transducer. • Replace Solenoid Driver Board.
19	No Recovery Tank present.	• Install Recovery Tank. • Refer to User's Manual
20	No vacuum in new Recovery Tank.	• Check Dip Switch configuration.
21	No vacuum during Vacuum Hold test. (2" loss.)	• Vehicle has a leak. Fix leak. • Check hose connections to vehicle. • Check Suction Separator gasket.
22	No vacuum during Vacuum Hold test. (2" loss.)	• Vehicle has a leak. Fix leak. • Check hose connections to vehicle. • Check Suction Separator gasket.
23	Ambient Temperature less than 32°F.	• Let unit warm up. Operating temperature is: 50-120 degrees. • Refer to Troubleshooting in Chapter 2.
24	Ambient Temperature less than 150°F.	• Let unit cool down. Operating temperature is: 50-120 degrees. • Refer to Troubleshooting in Chapter 2.
25	Discharge Temperature less than 20°F.	• Connect Temperature Probe. • Replace Temperature Probe.
26	Discharge Temperature greater than 150°F.	• Calibrate Temperature Probe. • Replace Temperature Probe.

ERROR CODES 27 THROUGH 30

ERROR CODE	DESCRIPTION	POSSIBLE CAUSE
27	Incorrect refrigerant settings.	• Refer to Appendix A. • Replace Processor Board.
28	High pressure switch on.	• Reduce High side pressure. • Turn vehicle system off.
29	No Refrigerant Tanks charging.	• Install refrigerant tank.
30	No Oil Cylinder available for charging.	• Install a Oil Cylinder.

APPENDIX C
SOFTWARE/HARDWARE REVISION

This appendix will give a breakdown of each software revision. The first section list the revision of software and the modification for each chapter that it supports. Second section list the hardware changes for each revision.

SOFTWARE REVISIONS

REVISION 2.00

* New release.
* Changed tank default to 30 pounds, Virgin Tank.
* Added lbs. and oz. to charging amount selection.
* Unit select mode now defaults to previously selected units.
* Charge amounts now selectable by selecting lbs. or kgs. first, then selecting oz. or tenths of lbs.
* Changed Temp. Probe routine not to look at dip switch; displays ---- if temp. is out of range instead of flagging errors.
* Added dip switch settings (sw.#6) for SUN icon.
* Added 30lb. or 50lb. reclaim tank weight in default settings. Unit now displays weight of refrigerant when installing a non-empty reclaim tank.
* Added feature in amounts routine, to display amount charged during charge cycle and time remaining in vacuum time.

REVISION 2.01

* Fixed bug in service mode where purge pressure could not be monitored.

REVISION 2.02 & 2.03

* Hold LED was not kept on during Suc Sep cycle. It is now.

REVISION 2.04

* Changed zero level in CAL routine to not reclaim when calibrating if pressure is at zero, resistor in plumbing board changed.
* Changed zero offset voltage. Caused reclaim in CAL routine even if pressures were at zero. See Service Bulletin #708 for resistor verification.

REVISION 2.05

* **NOT RELEASED TO PRODUCTION**
* Fixed bug when cancelling out of vacuum hold, timer not reset. Even if no vacuum time, goes into vacuum for remainer of hold time.
* Check suc vac instead of suc pres for no vacuum at end of vacuum time.
* Added refrigerant MP52 purge tables.
* Added refrigerant types to pressure check routine for crossover valve on/off values in charge mode.

REVISION 2.05 continue...

* Added one extra count to charge target weight to compensate for lost fractions.
* Fixed bug with pump pressure check on startup.
* Added 3 pass check on limits before flagging errors.
* Added debounce on float and high pressure switches.
* Remove pump pressure check; did not work reliably.
* Changed zero level in CAL routine to not reclaim when calibrating if pressure is at zero, resistor in plumbing board changed.
* Changed zero offset voltage. Caused reclaim in CAL routine even if pressures were at zero. See Service Bulletin #708 for resistor verification.

REVISION 2.06

* **NOT RELEASED TO PRODUCTION.**
* Opened test parameters in burnin to +/-3 psi on pressure checks. Changed anti-jig routine to +/-2 scale counts.

REVISION 2.07

* **NOT RELEASED TO PRODUCTION.**
* Added 3 minute wait in cal routine to let transducers warm up.
* Set temperature offset to 0 on power up if system not calibrated.

REVISION 2.08

* **NOT RELEASED TO PRODUCTION.**
* Removed pump pressure check.

REVISION 2.09

* Crossover valve now opens during reclaim mode when suction pressure reaches 0.
* Added feature to display amounts if in Error 7.
* Changed reclaim function to pull down to 15 in. hg. and rise to 5 in. hg.
* Added additional 15 in. hg. pull down after reclaim wait time.

REVISION 2.10

* Added routine to monitor and reduce pressure in suciton seperator bowl if bowl was not removed when red light is on.
* Added flashing red light during background recovery mode.

REVISION 2.20

* **Not to be used. All future versions will only support new small oil separator**
* Eliminated error 9.
* Changed error 7 to handle accurate charging if tanks are changed during slow charge.
* Changed reclaim cycle to only purge if reclaim lasted more than 3 minutes.
* Changed upper tank pressure limit in reclaim to be purge pressure + 40 psi for high pressure error.
* Added routine to check float switch in bowl to determine if float is really in the maintenance mode, or if a splash of refrigerant tripped the float. This mode will display “bol” on high side during the recovery mode for 3 minutes.
* Changed auto sequence to check both pressures before going to vacuum mode.
* Added routine to check pressure in recovery tank before charging.
* Added routine to check the pressure in the recovery tank during the reclaim cycle. If pressure is over 40 psi of vapor pressure (depending on temperature) the unit will purge and display error code 18. The user will be prompted to press HOLD to exit. This will eliminate long recovery cycles, and high pressure in the recovery tank.
* Added customer calibration routine just to calibrate transducers without adjusting temperature. (Press and hold **<HOLD/ENTER/RESTART>**FOR 5 SECONDS).

REVISION 2.21

* Changed oil solenoid on time at start of vacuum mode from 10 seconds to 5 sec, Added 15 delay to turn on suction separator solenoid in vacuum mode.

HARDWARE REVISIONS

LCD BOARD 7001-2153-01

REVISION A: (11-12-91); NEW RELEASE.

REVISION B: (08-30-93); Changed R1 to 1 megΩ, ¼ watt, 1%.

LED BOARD 7001-2159-01

REVISION A: (11-12-91); NEW RELEASE.

REVISION B: (06-03-93); Added Snap-on part numbers to print.

PROCESSOR BOARD 7001-2188-02

REVISION A: (04-09-92); NEW RELEASE.

REVISION B: (10-16-92); Changed software from 2.00 to 2.04

REVISION C: (06-01-93); Changed software from 2.04 to 2.08

REVISION D: (09-24-93); Changed software from 2.08 to 2.09

REVISION E: (09-24-93); Added Snap-on part numbers to print.

REVISION F: (01-27-94); Changed software from 2.09 to 2.10

REVISION G: (04-07-95); Changed software from 2.10 to 2.20

REVISION H: (04-0-9); Changed software from 2.20 to 2.21

REVISION J: (01-23-96); Redrawn in ACAD / Changed Snap-on part number on print.

REVISION J: (01-23-96); Redrawn in ACAD

PLUMBING BOARD 7001-2266-01

REVISION A: (04-24-92); NEW RELEASE.

REVISION B: (07-27-92); Added R40 10KΩ resistor.

REVISION C: (10-22-92); Added comformal coated spec's.

REVISION D: (12-15-92); Changed A/D converter.

REVISION E: (06-28-93); Changed R26 and R40 to 75Ω resistor.

REVISION F: (01-20-95); Added jumper wires to load cell connector to eliminate erratic readings.

REVISION G: (03-03-95); Revised board to Snap-on specifications.

REVISION CONTROL

	MINIMUM REWORK	MINIMUM REVISION	CURRENT REVISION
7001-2153-01	A	B	B
7001-2188-02	A	G	G
7001-2230-01	A	B	B
7001-2266-01	A	G	G

APPENDIX D
INSTALLATION INSTRUCTIONS

Appendix D is reserved for filing of Installation Instructions. When a kit is successfully installed in a unit, the Installation Instructions should be inserted here in alpha-numerical sequence.

At the bottom of each page of the instructions is the part number, the revision level and the date the instructions were printed. For example: 0692-2304-01 (01-15-95) REV A is at the bottom of the page. This is the number for the Installation Instructions; (01-15-95) is the date of printing; REV A is the revision of instructions. If a subsequent instruction is done, the Revision Level will change to the next letter and a new date will be applied.

Every time you get a new instruction, check the REV LEVEL and update this Appendix as necessary.

MODEL NUMBER	DESCRIPTION	INSTRUCTION NUMBER
1091-0288-01	Shut-Off Adapters for R-134a Units (NPR #62-2)	0692-2194-01
1091-0288-02	Shut-Off Adapters for R-134a Units (NPR #74)	0692-2194-01
1091-0301-01	2 oz. Oil Charge Kit for R-134a (NPR #71)	0692-2210-01
1095-0178-03	R-134a Filter Dryer Kit Series “B”	0692-2350-01
1095-0178-04	R-12 Filter Dryer Kit Series “B”	0692-2-01
1095-0291-01	Oil Charge Capability Kit for R-134a	0692-2178-01
ACT-111B	2 oz. Oil Charge Kit for R-12	N/A
ACT-4100	Unit Setup	0692-2301-01
ACT-4500	Unit Setup	0692-2303-01
ARG04040	R-134a Vehicle Adapter O-Rings (NPR #100)	N/A
EAK0010C01A	Charge Vaporizer Kit for R-12 Units (NPR #80)	N/A
EAK0016C00A	Moisture Indicator Kit (SB #739)	N/A
EAK0024C00AB	Shut-Off Adapters for R-134a Units (NPR #91)	0692-2310-01
EAK0027C00AS	R-134a Vehicle Adapter O-Rings (NPR #94)	0692-2320-01
EAK0031C01AS	Software Update Kit for ACT-4100 & MTC-4000 (SB #753)	0692-2326-02
EAK0031C02AS	Software Update Kit for ACT-4500 & MTC-4500 (SB #753)	0692-2326-02
EAK0031C06AS	Software Update Kit for MRC-450 & MTC-4500 (SB #753)	0692-2326-02
EAK0031C09AS	Software Update Kit for MRC-450 (Ford Rotunda) (SB #753)	0692-2326-02
EAK0031C10AS	Software Update Kit for MRC-400 (SB #753)	0692-2326-02
MRC-400	Unit Setup	0692-2193-01
MRC-450	Unit Setup	0692-2304-01